

COAL AGE

Vol. 5.

NEW YORK, JUNE 27, 1914

No. 26

Back To The Mines

BY BERTON BRALEY

Written expressly for Coal Age



Back to the mines with you, drawers of dividends,
Back to the mines where your treasure-house lies,
Back to the men who are digging your coal for you
Back where the Job is right under your eyes,
Dingy and dull is the mining community,
Ugly its outward and visible signs,
—Therefore it gives you the more opportunity
Back to the mines!

Though it is gay in the mighty metropolis
Far from the mining town, grimy and grim,
Far from the spot where the miners are laboring
Down in the galleries dusty and dim,
THESE are the people who daily are needing you,
Life runs for them on the hardest of lines,
Go and live close to the folks who are feeding you,
Back to the mines!



Distance is dulling to kindness and sympathy,
Dulling to skill and efficiency too,
Absentee owners grow careless and cynical
Anxious for nothing but dividends due,
Back to the mines—and to justice and sanity,
Learn how the other half struggles and pines,
Back with the woes and the joys of humanity,
Back to the mines!

The Moving Picture in Coal Mining

BY FRANK H. KNEELAND

SYNOPSIS—The American mining industry is a confusion of tongues; pictures may, however, be clearly understood by all. Recognizing this fact a progressive West Virginia company has adopted the cinematograph as a means of instructing its employees in methods of both safety and efficiency.

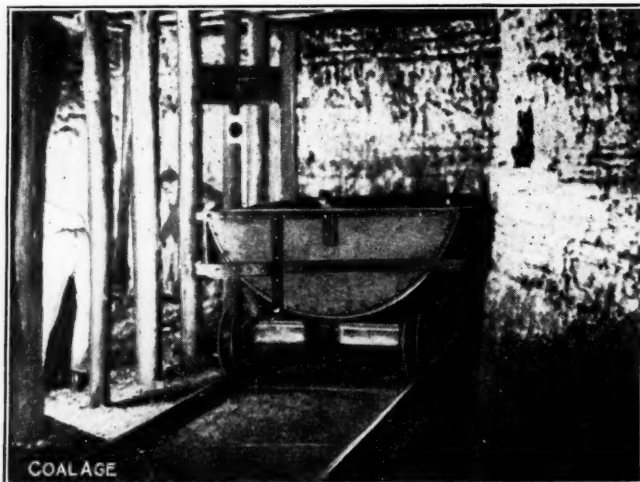
Any language, either articulate or written, has its limitations, territorial or otherwise. Numerous as have been the attempts to invent and establish a world tongue, they have all met with dismal failure, and we have at the present time no speech or dialect which may be universally understood.

This does not signify, however, that a person speaking one language is unable to communicate with those unfam-

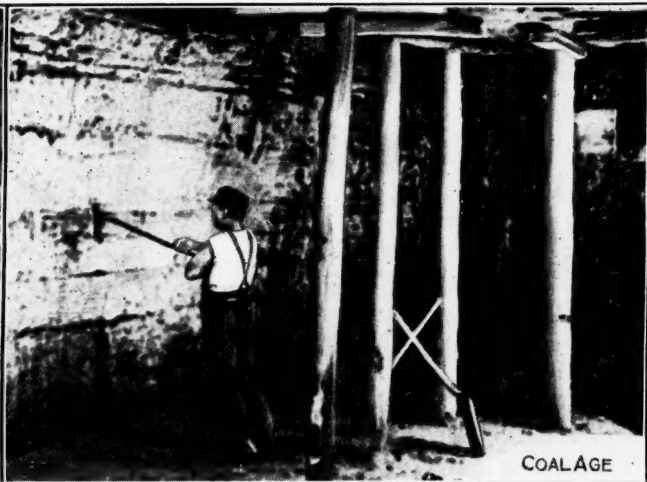
therefore, whereby ideas may be transmitted from one person to another without a knowledge of a common tongue, is by means of sign language; in other words, a visual language without an alphabet.

The ranks of our present-day coal miners are recruited largely—probably considerably over half—from the countries and municipalities of southern Europe, where illiteracy is prevalent and where the languages and dialects are numerous. In short, our coal-digging forces are composed largely of Italians, Greeks, Poles, Slavs, Lithuanians, Bulgars, Montenegrins, Huns, Armenians, with a more or less generous admixture of races from other climes, such as Germans, Scandinavians, Russians, Hindoos, Chinese and Japanese.

Many, if not most of these men, when they first apply



LOADING OUT THE "BUG-DUST." NOTE DANGER BOARD ON THIRD POST



DRILLING THE CENTER SHOT HOLE. NOTICE CLEANNESS OF THE PLACE

miliar with his particular tongue. On the contrary, by the use of motions, gesticulations and grimaces, he may readily make his wants and wishes known. In other words, communication may be established by means of signs.

The engineering profession perhaps possesses the nearest semblance to a universal written language that the world has yet seen. The working drawing and sketch are not hedged in by the limitations of time and know no territorial boundaries. The plans of Hiero and the drawings of Leonardo da Vinci are as intelligible to the engineers of today as they were to the Egyptian workmen 200 years before the dawn of the Christian era or the Italian artisans of the middle ages. Thought preserved in the form of a properly made drawing is universally intelligible throughout all lands and eras to those who plan.

The working drawing, however, is made with one primary and fundamental object; namely, construction. If we wish to convey other ideas than those structural, we must resort to other means, of which the picture is the most common and intelligible. Furthermore, a picture or painting conveys a meaning and an idea to those who may be utterly ignorant of sound symbols and punctuation marks. The only means at present at our command,

for work at our coal mines, are not only utterly ignorant of our language and customs, but also of the first principles of coal mining. It is at present the law in the anthracite region of Pennsylvania that no man may assume the duties and responsibilities of a miner who has not first served at least a two years' "apprenticeship," passed a miner's examination and must hold a miner's certificate. A similar statute is in force in Illinois, and there is and has been strong agitation for like enactments in other mining localities.

THIS "APPRENTICESHIP" IS NOT PERFECT

While this "apprentice" system may be an improvement over the conditions existing in these fields before its adoption, and is greatly superior to no instructions in the trade whatever, it nevertheless leaves much to be desired and is frequently subject to deplorable abuses. The possibilities of the evasion or perversion of such a statute are so well known as to require no further comment here.

Furthermore, however much knowledge the prospective miner may acquire under this system of the gentle art of coal digging, it is certain that not all, and probably only few of the instructors are men both careful and efficient in their daily work.

The result is obvious. The apprentice learns not only the few proper and efficient methods of his instructor, but acquires his many foibles and shortcomings as well.

It is probable that the state law requiring a term of mining apprenticeship was not promulgated with the primary idea of either rendering the calling more safe or insuring greater efficiency of the individual worker. On the other hand, this measure was doubtless fostered by the miners' union with the intention of throwing a legal barrier around the member and his job, and thus rendering it unlawful for the coal operators to place at work as miners men who had not seen at least two years' service in the mines of Pennsylvania.

In those coal fields not employing this apprenticeship system, conditions may be either worse or better than where it is in vogue. In most mining localities the old method of procedure still prevails. A man applies for work and is asked certain questions concerning previous employment. As his principal object is at the time to secure a job, he usually answers "yes" or "no" to the questions propounded as he deems most advantageous to his cause. His fellow countrymen and friends have probably coached him as to what to expect and what to reply.

We will suppose that he is successful in securing a position as a miner and reports for work. If he then knows how to take care of himself and keeps out of danger, all is well; if not, he is possibly either injured or killed. In this latter contingency the reports of the accident show that he had received all customary attention and instructions, and that his misfortune was due solely to his own fault, the foreman under whom he worked and the company employing him being blameless.

PROGRESSIVE COMPANIES MAKE SURE

Among the most progressive companies, however, and especially those considering "safety first," it has been the custom for some time to take nothing for granted, and to be sure that all men entering their employ are properly instructed in the work they are expected to do. When hired, every man is given a book of instructions printed in several different languages, and upon going to the mine is placed in charge of a sub-foreman, who watches him closely, giving from time to time such verbal instructions as he may consider necessary.

In coal mining as in most other occupations, there are but few movements or operations to which "scientific management" may not be applied with benefit. To do this intelligently, it must be done by efficient instructors and all false motions and unnecessary movements avoided. Here, as elsewhere, there is one, and usually only one, right and proper method of procedure, and this right and proper method of performing any operation is the one in which the workman should be thoroughly instructed.

In order to render this instruction effective, one or more of several methods may be employed. The men may be taught verbally at frequent intervals by a sub-foreman or other person, who must not only give them detailed instruction, but illustrate the same by frequent examples. Where the men to be instructed lack a knowledge of the language in which the instructions are given, or are unable to understand any language if put in scientific terms, or those necessary to give full and detailed explanations, it is impossible to teach them verbally; they must be shown. There are two ways of showing such men; one is to have experts do each particular

kind of work under their observation. It will be necessary to have this work gone through with three or four times before the men will comprehend what the expert is driving at, and such teaching becomes an endless job.

THE ADAPTABILITY OF THE MOVING PICTURE

The other method is to have motion pictures made of an expert doing each particular kind of work, then have these exhibited before the men as often as it is deemed necessary. This can be done more quickly, more perfectly and more economically, produces better results and can be more readily comprehended by the men themselves than any amount of verbal instructions given in the mines. For just as the working drawing is comprehensible to the engineer, so the moving picture is understandable by everyone, child or adult, alien or native.

It was with the idea of familiarizing its employees not only with means and methods of greater safety in the mines, but also with the standardization of mining processes that the United States Coal & Coke Co., a subsidiary of the U. S. Steel Corporation, with mines in McDowell County, W. Va., adopted the moving picture as a means of instruction.

The stereopticon had been in use for some time by the H. C. Frick Coke Co., and other steel corporation subsidiaries in teaching methods of accident prevention. It was believed, however, that this means of instruction was open to many objections. It showed how *not* to do things, rather than how they should be done. Furthermore, when a series of lantern slides were exhibited, illustrating a number of fatal accidents, the impression made upon the audience was unquestionably a bad one, and particularly so upon the women, who, understanding little or nothing of actual mining operations, would imbibe the belief that coal mining was an extremely dangerous calling and would hardly care to have any of their male relatives engaged therein. They at least would fail to grasp the fact that the four or five accidents which they had seen illustrated upon the screen in the course of the evening had been scattered through perhaps a year's time and had occurred in several different mines. So far as the miners themselves were concerned, the pictures showed what they should not do, and the result of failure to observe certain precautions. While this was in a sense beneficial, it left the miner to a considerable extent at sea as to what should have been the proper method of procedure.

Furthermore, it was utterly impossible to show in lantern slides the most efficient methods in coal mining. With moving pictures on the other hand, it is possible to show to the novice and man of long service alike, the best methods which years of experience have been able to devise for the prevention of accidents and the attainment of efficiency.

THE METHOD OF TAKING THE PICTURES

The best method of taking moving pictures underground had to be determined by experiment. Although careful inquiry was made, both by the company and by the U. S. Bureau of Mines, whose photographers actually took the pictures, no data were found anywhere about the light required for taking such pictures. After a few trials with arc headlights, it was found necessary to install eight direct-current "Kleight" lamps, with a capacity of 5000 c.p. each, and using a specially prepared carbon rich in violet rays, in order to cover the work with-

out casting shadows and to get the light uniform and sufficiently strong for instantaneous exposures. The power consumption of the lamps when in operation was about 75 kw., and as they were connected to the trolley wire and there was a considerable reduction in the voltage when the mine locomotives were pulling heavily, most of the pictures were taken after these machines had stopped running in the evening. The lights were connected to the trolley line by 2-0 wire, were set on movable pedestals, and provided with adjustable reflectors.

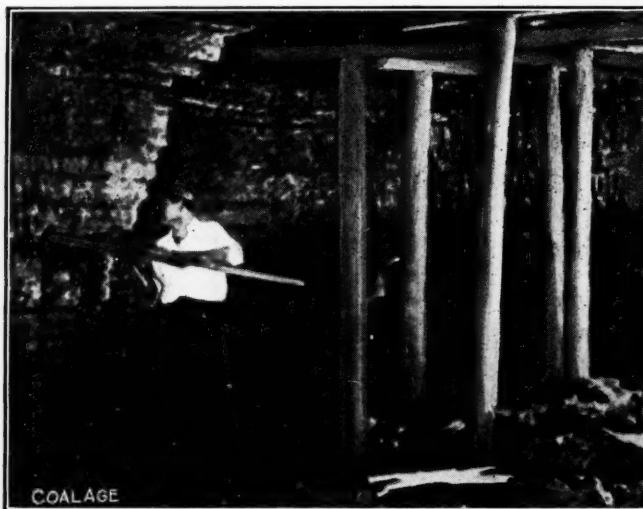
In order to show the work in detail it was necessary to cover as large a space as possible at the working face, so that two men might be shown at work simultaneously and illustrate each operation as it was performed. This necessitated cutting a pocket at the face of the room, about 15 ft. deep on one side and 25 ft. deep on the other.

The men selected as subjects for the moving pictures were careful workmen who always looked well after their

THE ENTIRE PROCESS OF COAL PRODUCTION IS ILLUSTRATED

The series of pictures taken illustrated the entire process of coal mining, from the working face to the railroad car. The assistant mine foreman was first shown entering his section of the mine and closing a gate, forming a danger board and debarring the miners from entering. He is then seen going into a room up to the working face, testing the air for gas, and the roof and face for loose coal and slate, and placing his O.K. and the date upon the face of the room and the sides.

The miners are seen arriving at the entrance of the section and waiting outside the closed gate, in the meantime reading the special notices and accounts of accidents as posted upon the bulletin boards. The assistant foreman is then seen returning to and opening the gate, allowing the miners to enter. He calls one man to him



LOADING A SHOT HOLE. A WOODEN TAMPING ROD IS USED



ASSISTANT FOREMAN INSPECTING PLACE AFTER FIRING A SHOT

own safety and who performed their tasks neatly and quickly with the fewest possible motions. This, of course, necessitated selecting efficient men, who habitually performed a considerable amount of work daily.

These men were kept under observation by both the mine inspector and the division engineer for some time before the pictures were taken, and anything in their method of working which was not strictly in accordance with standard practice, was corrected. The same statement holds true for all people—miners, machine men, inspectors, etc.—appearing in the pictures.

In order to secure good views of the several movements it was necessary to change the positions of both light and camera at frequent intervals. When all of these changes in position had been satisfactorily agreed upon, the men practiced their parts three or four times within the range of the camera before pictures were actually taken. This was deemed necessary on account of the nervousness of the operatives more than for any other reason, as in doing this work before the camera they would commit mistakes which ordinarily would not be perpetrated. In spite of this nervousness, however, the pictures were remarkably good and showed that but little attention was given the picture-taking machine when the men were actually engaged in their work.

and explains that there is a certain unusual condition existing in his room.

Two miners are then seen entering their room, and in spite of the fact that the assistant foreman has just placed his O.K. upon the face and sides, they proceed immediately to make another inspection of conditions. The miners find a loose piece of roof and proceed forthwith to set a crossbar, after which they examine the remainder of the place. Finding this safe they lay the track up to the face and push a section of it under the coal, which has been undercut during the night.

A LECTURE ACCOMPANIES THE EXHIBITION

An idea of the details and minutiae covered by these views may be gained from the lecture accompanying their exhibition to the company's employees, from which we quote as follows:

The miners are now laying track in order to run the mine cars up to the face of the coal for loading. It is necessary to take up the short length of track each evening after the coal is loaded out in order to allow the mining machine to properly make its undercut for the next shift. You will notice that Carnegie steel room ties and 20-lb. rail are used. These steel ties do not require spikes or bolts, there being a clip about 6 in. from the end which turns around and fastens the rail to the tie. With these ties and using 20-lb. rails the track can be laid under the coal where it has been undercut by the machine. When the coal which has been shot down

over the track is being loaded out the car can always be kept at the face and the coal loaded over the side.

Approximately 4.3 per cent. of the total time spent by the miner in the working place is consumed in laying track.

The workmen are now making the track straight, which is extremely important. Crooked tracks are often the cause of derailments allowing men to become injured in wrecks or in replacing cars, to say nothing of the expense and time lost by such accidents. The track as laid leaves an 8-in. clear space between the side of the cars and the props and rib. The driver is now bringing in an empty car for the miners to load. While he sets the brakes a miner puts a safety block under the wheel to keep the car from running away. This mine is equipped with all-steel mine cars, many of which are supplied with Carnegie rolled steel wheels made in the same manner as those used on passenger and freight cars.

The miner is now loading the fine coal made by the mining machine in the undercutting process. This fine material or "bug-dust" must be loaded before shooting to lessen the possibility of an explosion of the fine coal or dust by a blown out shot. The dust is also cleaned out from under the cut so that the coal may be shot down more readily.

You will here get a good view of the systematic timbering, which requires posts to be set 3 ft. on centers on roadways, with 6-ft. cap pieces turned at right angles thereto, which affords some protection over the roads. The back rows of posts are set on 6-ft. centers and cap pieces are

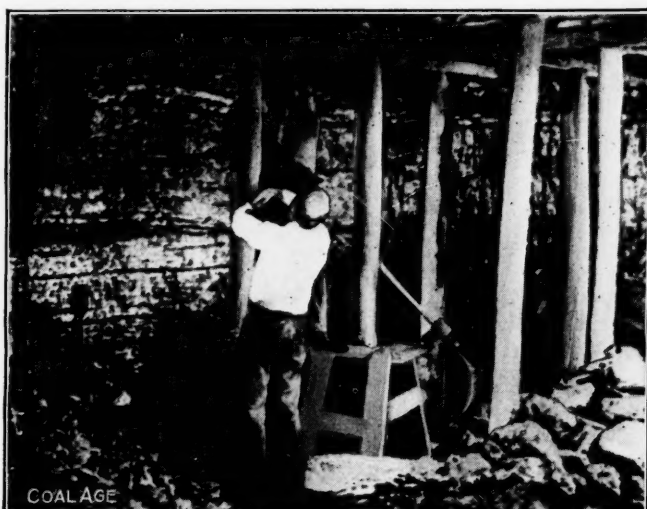
in it. While one of the miners is drilling the hole for the center shot the other is preparing cartridges of clay tamping and putting his detonator in the powder charge. He makes the hole in the latter for the detonator with a wooden pin provided for this purpose. Clay for tamping is brought in from the outside and put in each working place.

Having completed his cartridges he starts back to the working place where his "buddy" has been drilling the center hole for the shot. The miner is now loading the center hole. The assistant mine foreman is required to examine the place and tamping, attach the wire and shoot the hole. You will notice that a wooden rod is used for tamping, also that one miner is drilling the rib hole while the other is loading the center hole, thus losing no time.

The shot is now properly tamped. The assistant mine foreman attaches the wire and he and the miners leave the place, one of the latter taking out all of the tools.

Having reached a place of safety, the assistant mine foreman fires the shot by means of an electric battery, after which he returns to examine the place before the men are permitted to enter. Finding some loose slate, he directs the miners to take it down. The assistant mine foreman is required to stay with the men until all dangerous slate is removed and all necessary posts set. If that piece of slate had fallen on a man, it would have killed or severely injured him.

After the slate has been taken down, both the assistant mine foreman and the miners examine the roof to see that



COAL AGE

PLACING A PROP BEFORE LOADING OUT AFTER A SHOT

placed parallel with the roadway, the cap piece being 4 ft. long in rooms.

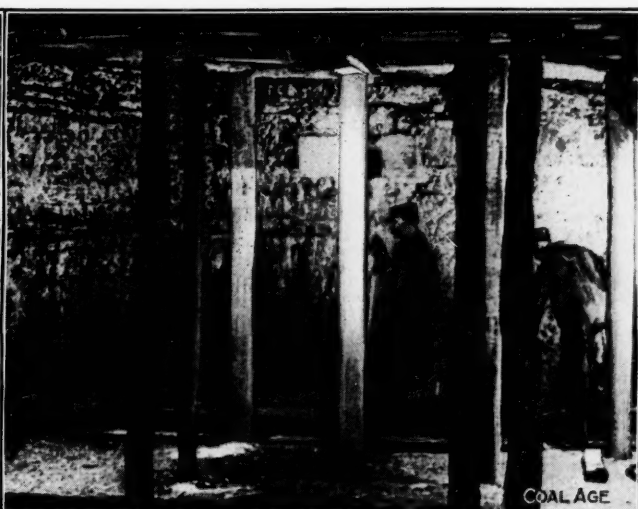
This system of timbering requires three rows of posts in all places over 18 ft. wide. Posts are required to be kept within 6 ft. of the coal that is being worked at all times, and where conditions are bad, they must be set closer than this. Approximately 6.5 per cent. of the total time spent by the miner in the working place is consumed in timbering.

You will notice the safety board hanging on the post, upon which the assistant mine foreman marks the time of his visit each time he enters the place, which is of great assistance in determining the time the assistant mine foreman was last in the place in case a man should become injured between his visits. This board also shows the length and width the place is to be driven. It is moved up as the working place advances.

The car is now about loaded and the driver comes in to take it down to the landing for the haulage motor. Notice that the miner removes the safety block from the front of the wheel, and that the driver rides on the rear end of the car, as it is against the rules of the company for anyone to ride on the front end of motors or mine cars whether empty or loaded.

PROPER METHODS OF SHOOTING ARE ILLUSTRATED

After the machine cuttings have been loaded out, one miner drills a center hole for shooting down the coal. It is the rule of the company to shoot the coal down with three shots, one being in the center of the room, or heading, and one upon either side, the center shot being made first, and only one hole being fired at a time. The shot hole must be thoroughly cleaned so that there will be no fine coal left



COAL AGE

COAL CUTTER READY TO START ON THE SUMPING CUT

it is safe. Approximately 2 per cent. of the miner's time is consumed in taking down loose slate.

MINUTE DETAILS ARE SHOWN

This picture shows a closer view of the hole being charged for shooting, with two miners doing the work. They tear the paper off the end of the adjoining sticks of explosive so that the latter will come together. This makes the explosive one mass and avoids any liability of having one stick fail to detonate when the shot is fired. The limit of charge allowed in the mine is 2 lb. for one hole and only one hole may be fired at a time.

No explosive is permitted to be used that has not passed the test of the U. S. Bureau of Mines and been designated as a permissible safety powder. In former years it was the custom to use black powder for shooting down the coal. This was extremely dangerous. The permissible safety explosives give a much shorter flame and a lower exploding temperature.

Approximately 4.3 per cent. of the miner's time is consumed in drilling, 3.8 per cent. in charging holes and 0.4 per cent. in waiting for shots.

As the miners load the coal, they are required to throw back the slate and refuse which accompanies it. The coal adheres to the slate and has to be cut loose. The miner at the rear makes room for the car to be pushed to the face, which enables both men to load from the sides. Approximately 7.3 per cent. of the miner's time is consumed in cleaning the coal. Undercutting to a depth of 8 ft. 6 in. allows the room to be driven 20 ft. wide and provides a full day's work for two men and also enables practically all the coal to be loaded into cars without rehandling.

Approximately 41½ per cent. of the miner's time is consumed in loading coal, while only 3.2 per cent. is consumed in reshoveling.

The pictures show the miners removing a short section of the track after the day's work has been done and the coal completely loaded out, the assistant foreman making his evening inspection to be certain that the place is safe for the incoming machine men. The miners leave the mine, hanging their checks upon the check board. The machine men with the undercutter enter the working place, unload the machine, draw it to the face, make their sumping cut, make the crosscut, remove the machine, load it upon its truck and move out. In all of these operations, a standard practice is carefully shown, and the work is accomplished with the least possible manual labor, the least loss of time and with the greatest possible safety.

PROCESSES OUTSIDE THE MINE

Views are also shown of the haulage motors leaving the drift mouth at the head of a loaded trip. The trip is seen arriving at the tippie, the motor uncoupling, passing around a special runaround and recoupling to a waiting trip of empty cars. The coal cars are shown passing over the dumps of the tippie, discharging their contents and proceeding thence to the empty track. A view is also shown underneath one of the tipples, where a 70-ton coal car may be loaded in approximately one minute.

The primary idea for taking and exhibiting these pictures, as explained above, was to show how the various operations of coal mining might be done with the greatest safety, efficiency and dispatch. Upon their exhibition before the company's employees considerable interest was aroused and no small amount of discussion among the miners themselves was stirred up. Such discussion is, on the whole, beneficial, as a miner will frequently see some point which the expert may have entirely overlooked.

It is the intention later to take detailed pictures of many of the single operations necessary in mining and to standardize these at all mines.

EDUCATIONAL VALUE QUICKLY APPRECIATED

Although these photographs were primarily made for exhibition before the employees of the United States Coal & Coke Co., their possibilities as a means of instruction were quickly recognized, and they have accordingly been exhibited quite generally throughout Westmoreland and Fayette counties of Pennsylvania, both in the mining towns and the larger communities as well. They have been shown in New York, Philadelphia, Harrisburg and Pittsburgh; in the states of Indiana, Illinois, Virginia and West Virginia and will shortly be sent to New Mexico. They have also been shown before the Canadian Mining Institute, at Montreal, and a copy of the film is being prepared for use by the University of West Virginia in mining-extension work.

As stated above, these pictures were taken by and under the direction of the U. S. Bureau of Mines. From the best information available they are the only extensive views of the kind ever secured and, together with the stereoptican slides of the H. C. Frick Coke Co., previously mentioned, form what is believed to be the most comprehensive exhibit ever gotten together illustrating coal-mining devices and methods for the attainment of both safety and efficiency.

While it is doubtless true that the full significance of these pictures cannot be acquired without a thorough understanding of the accompanying lecture, yet it is unquestionable that much good is done the miner who sees the picture, but is unable to understand English. The constant and ever-recurring inspection of the working places by all those who enter them, regardless of their mission or purpose, the placing of the safety blocks on the rails, the careful setting of timbers to support a weak roof, and the other safety precautions, cannot fail to be intelligible and to have their effect upon the most ignorant or most unintelligent person in any mining community. He is dull, indeed, who cannot understand a picture.

Pumping Out an Anthracite Mine

Floating on two rafts on the surface of the slowly receding water of the Schooly mine of the Pennsylvania Coal Co., which has been flooded for the last 15 years, are two 2-stage centrifugal pumps which will lift 2000 gal. of water 375 ft. in one minute. The pumping out of this mine began on Jan. 27 of this year and will take many months to accomplish. The mine is 588 ft. deep, and the water was lowered about 130 ft. in the first two months of work. At 181 ft., the pumpers began removing water from the gangways and chambers as well as the shaft, and the work has proceeded more slowly. At this depth they met the Checker vein. At 311 ft. they will meet the Pittston vein, at 389 ft. the Marcey vein, and at 581 ft., the Red Ash vein.

The method of freeing the mine from water is unique and interesting. The pump, which is driven by a vertical motor placed directly on top of it, is contained in a huge iron tank which forms the float. The buoyancy of the float or raft is sufficient to sustain the weight of the tank, pump and motor, but the tank is suspended by wire ropes which are paid out as the water recedes. These are for use in case of emergency, and have proved a wise precaution. The water is pumped up through a fixed pipe in the shaft, connected to the pump by a flexible rubber hose of large diameter. When the hose, which must stand a pressure of 200 lb. to the square inch, is stretched to its full length, the pumping is stopped and a new length added to the fixed pipe in the shaft.

The estimated amount of water in the mine is 600,000,000 gal., but there is an additional flow of 2000 gal. a minute coming into the mine to be coped with. There are other operations near this flooded mine, separated by barriers, and the Pennsylvania Coal Co. does not want to leave that vast body of water threatening its workmen, whether the operation is profitable or not. The two 10-in. streams which are contending with this huge quantity of water are making slow but steady progress, but the prize to be won is 7,000,000 tons of coal.

In the early days of the enterprise the water in the main shaft got 20 ft. lower than that in the adjacent air shaft, and when the latter finally caved at the sides, or the obstruction which was holding back the water gave way, the pump, motor and men were hurled upward in the main shaft. Fortunately, no harm was done, and the wisdom of having the wire ropes instead of relying exclusively on the buoyancy of the tanks was effectually demonstrated.

Notes on the Mineral Fuel Co.'s Development in Eastern Kentucky

SPECIAL CORRESPONDENCE

SYNOPSIS—Some comments on recent developments in the Elkhorn field of Kentucky, with interesting notes on the preliminary steps. Construction was carried on along unusually elaborate lines and involved heavy initial expenditures.

For two years the Elkhorn field, of eastern Kentucky, has been attracting unusual attention throughout the country, and a number of large concerns have come into the territory. Among these is the Mineral Fuel Co., composed largely of Maryland, Pennsylvania and West Virginia capitalists.

Three years ago there was not a railroad line within 50 miles of this field, but at that time the Louisville & Nashville and the Baltimore & Ohio became interested. The former purchased the Lexington & Eastern, extend-

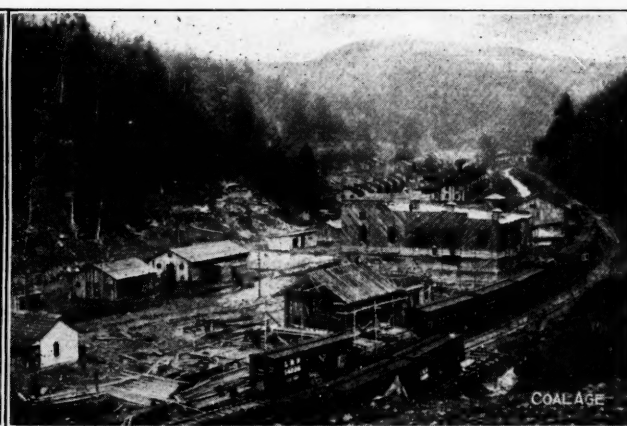
to work on a similar town on Pottersfork, called Haymond, in honor of Thomas S. Haymond, the manager of the work. Mines Nos. 303 and 304 were opened here. The Louisville & Nashville then let a contract for the construction of a three mile branch up Pottersfork to Haymond and another mining town on Yount's Fork, called Hemphill, was started. Mines 305 and 306 were opened here. The railroad company then began construction on another three mile branch up Yount's Fork. The output of mine No. 301 at Fleming is being shipped to the markets of the Northwest, while mine No. 302 is shipping to the Central West and South.

CONSTRUCTION OF THE TOWNS

About 300 houses have been completed in Fleming, all of which are occupied. An unusually large company



MINERS' HOUSES AT HAYMOND, KY.



NEW CONSTRUCTION WORK AT FLEMING, KY.

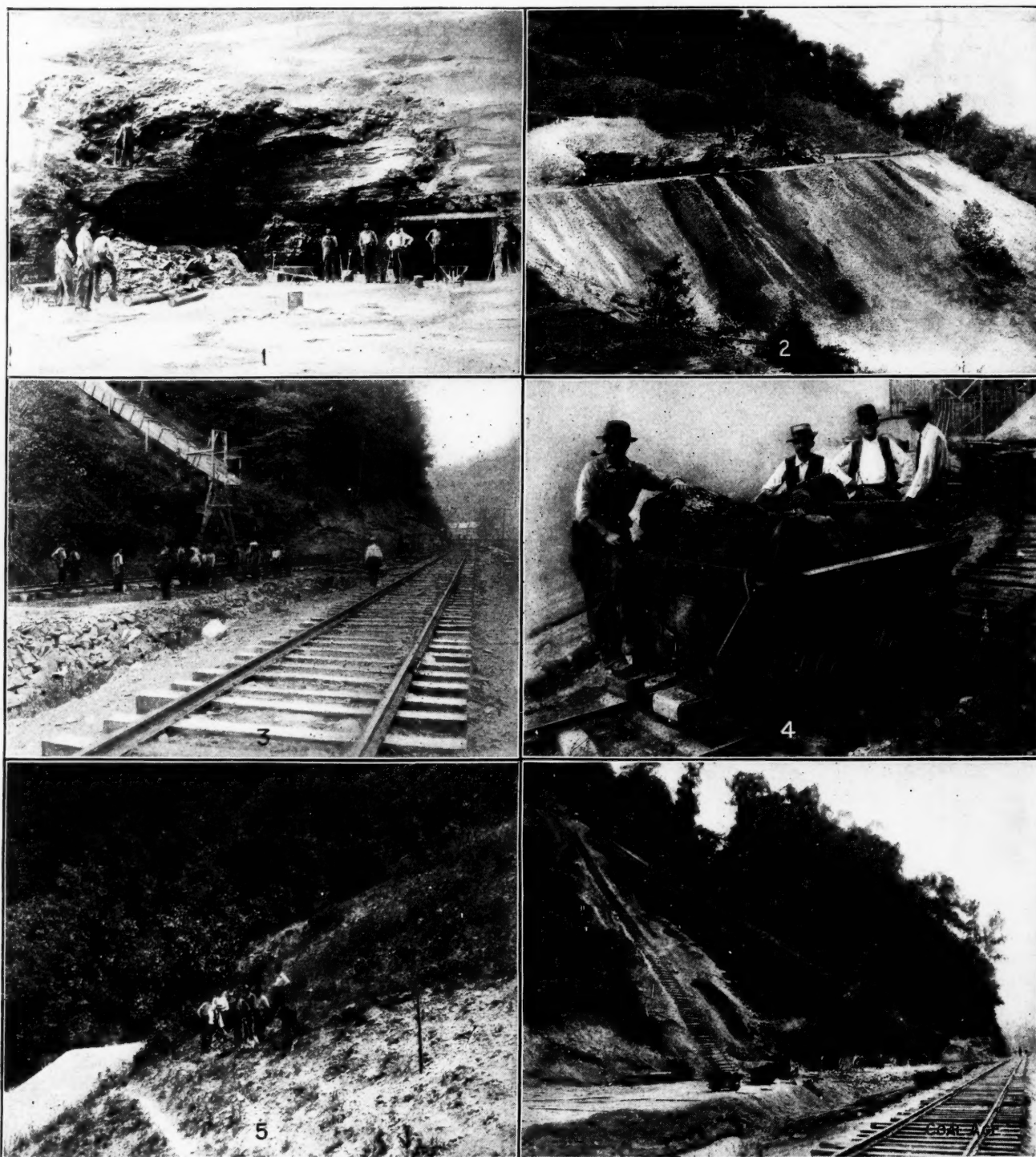
ing from Lexington to Jackson, Ky., 94 miles and made immediate plans for construction along the North Fork of the Kentucky River from Jackson to Boone's Fork, a distance of about 103 miles. The Baltimore & Ohio, made arrangements with the Chesapeake & Ohio's Big Sandy Branch and built a line from Shelby Station through a rich field, penetrating the narrow valley of Elkhorn Creek to its headwaters where the Consolidation Coal Co. (after purchasing 100,000 acres of coal) announced a mammoth development program. Today the terminus of the Louisville & Nashville is at the town of McRoberts, built by the Consolidation Coal Co., three miles above Fleming, the center of the operations of this company. The terminus of the Baltimore & Ohio is at Jenkins, four miles away on the Elkhorn Creek side. All this territory is rapidly becoming a great industrial section.

Some time ago the Mineral Fuel Co. was organized after purchasing approximately 10,000 acres of coal on Boone's Fork on the Louisville & Nashville railroad, and started the development of about 5000 acres of this property. Mines 301 and 302 were opened and the first shipments were made in October, 1913. When the construction at Fleming had been completed, the company set

store, a substantial, well built office, a municipal building, a hotel, Y. M. C. A., post-office and bank building have been completed, while school and church buildings, hospital, etc., are planned for the immediate future. A water system is now under way, the present supply being obtained from wells.

At Haymond, 250 buildings are completed, over 100 of which are occupied, and this will shortly have to be increased by another 100, making a total of 350 for the whole town. It is also probable that another 100 will be necessary. These will include a number of modern business blocks, hotel, office building, machine shops, supply houses, commissary building, etc., while churches and schools are under way and will be built this year.

Hemphill's buildings will consist of 300 houses, about the same as those in Haymond, with a probability of another 150 in the near future. Fleming, according to a late announcement, will have 230 more houses built this year. The Nicola Building Co. of Pittsburgh, Penn., has the unusually large building contract and is prosecuting the work vigorously. They constructed the cities of Jenkins and McRoberts, and are also building Wayland and Weeksbury for the Elkhorn Fuel Co. on Beaver Creek. The Elkhorn company is a subsidiary of the



OPERATIONS OF MINERAL FUEL CO. IN KENTUCKY

1—Opening drifts to mine No. 301. 2—Grading for tramway. 3—Laying steel for mine siding. 4—First mine car loaded at Fleming, Ky. The fellow under the derby who looks so pleased is Tom Haymond. 5—Marking location of mine 301. 6—Constructing incline plane and coal chute.

Mineral Fuel Co., and is developing some 25,000 acres in that section.

The Mineral Fuel Co. is spending thousands of dollars in the interests of its employees. In Fleming a Y. M. C. A. has been completed, while Haymond and Hemphill will each have buildings, fitted up for moving-picture shows. A large central hospital will also be built in Fleming at a considerable cost and much attention is being devoted to improving the local highways.

All the houses are neat, comfortable and convenient, having six and eight rooms, and plastered inside. Plastering is used because it is more cleanly and sanitary and makes a warmer, cleaner house than ceiling. There are grates in every room except the kitchen, which is provided with a brick flue.

The towns are laid off with uniform streets, and there are alleys in the rear of all buildings for convenience in removing refuse, delivering coal, etc. All miners' houses are alike and painted the same, while those of the offi-



TOP-CUTTING MACHINE LEAVING ROOM

cials are different. There are electric lights in every room, the cost of which is 25c. a month, each. The company receives its light and power supply from the large central power station of the Consolidation Coal Co., at Jenkins.

The miners are required to keep their yards clean, and the company hauls away all trash and refuse. They also furnish lime for the closets which are well built and will later be connected with a general sewerage system. At present they have a vault which is emptied every day.



PERMANENT TIPPLE AT MINE NO. 301

The company is determined to run its plants on strictly sanitary lines.

The coal is known as the Elkhorn seam and runs on an average from 8 to 9 ft. thick. At Haymond the seam is 8 ft. and 6 in. thick. The same seam but running as much as 10 ft. thick, is being mined around McRoberts and Jenkins. It is a fine splint coal for domestic use.

It is estimated that 100 years, at least, will be required to exhaust the local supply; thus it can be seen why the Mineral Fuel Co. is putting in such permanent works.

In the mines, cross entries are turned at right angles at intervals of about 400 ft. The entries are driven about 13 ft. wide with an 18-ft. pillar. All entries are driven

on sights. Rooms are turned from the cross entries on 35-ft. centers, and the coal mined by the room-and-pillar advancing method, with 25-ft. rooms and 10-ft. pillars.

I wish to extend thanks to General Manager Thomas S. Haymond for the many courtesies which have made possible the preparation of this article.

Output of Anthracite Coal Beats All Records

According to the figures reported to the Topographic and Geologic Survey of Pennsylvania, working in coöperation with the United States Geological Survey, the production of anthracite coal in 1913 was 6,395,825 gross tons in excess of the output of 1912, an increase of 8½ per cent. Part of this increase is undoubtedly due to the closing of the mines in 1912, pending the settlement of the mining scale, yet it is almost 1,000,000 gross tons in excess of the production of 1911, which was the previous high record year. This marked increase again brings up the question of the ultimate maximum output of anthracite coal. While it is well known that the output of bituminous coal doubles each decade, yet the increase in the output of Pennsylvania anthracite shows no such change. This is, at least in great part, due to the fact that anthracite is no longer a manufacturing fuel, but essentially a domestic one. It has been thought by some that the present output will not be greatly increased.

The average selling price at the mines for several years is shown by the following table:

Year	Average Price per Gross Ton
1903.....	\$2.28
1908.....	2.13
1909.....	2.06
1910.....	2.12
1911.....	2.17
1912.....	2.36
1913.....	2.38

The average cost of mining anthracite coal in 1909, as reported by the Census Bureau was \$1.93 per ton, exclusive of any charges for depreciation, amortization or interest. On the same basis, with the increase in the mining rate as provided in the agreement of May 20, 1912, the cost would be, according to Mr. E. W. Parker of the United States Geological Survey, \$2.07 per ton. This would mean in 1913 that the average selling price was 31c. per gross ton above the mining rate, from which must be deducted the items of depreciation, amortization, interest, and the increase in all items of expense not covered by the agreement of May 20, 1912.

The following table gives the total production in each of the several counties for the years 1912 and 1913:

PRODUCTION IN GROSS TONS OF ANTHRACITE COAL IN 1912 AND 1913 BY COUNTIES		
County	1912	1913
Carbon	2,568,305	3,066,314
Columbia	1,079,866	1,078,481
Dauphin	843,841	946,670
Lackawanna	19,283,814	20,240,490
Luzerne	28,289,879	31,539,379
Northumberland	6,020,440	6,261,502
Schuylkill	16,038,507	17,328,666
Sullivan	579,673	
Susquehanna and Wayne	532,808	1,123,192
River dredges	85,722	133,986
Total	75,322,855	81,718,680
Total value	\$177,622,626	\$195,181,127

Up to date the observations carried out in the Hatunhuasi coal region of Peru show the existence of from 35,000,000 to 40,000,000 tons of coal.

A Simple Method of Calculating the Resistance of Bonded Rail Joints

BY VINCENT RHEA*

SYNOPSIS—Formula and tables are given, by the use of which the resistance of any compressed terminal bond may be ascertained in terms of feet of unbroken rail.

Since many of the mining companies have adopted the compressed terminal type of rail bonds, the question, "What is a standard for a properly bonded rail joint?" has frequently arisen. It is impossible to assume an arbitrary value for a bonded joint, as the length of the bond, the size of the terminals and the weight of the rail in which they are installed, must all be taken into consideration.

It is essential, both in making tests of bond installations, and in estimating new work that the resistance of a bonded joint be known. The following tables and formula will show the electrical mining man just what resistance a well bonded joint will have.

To find the resistance of a rail joint bonded with compressed terminal bonds, the following formula is used:

$$\frac{L \times R + 2 \times CR}{RF} = JR$$

in which

L = Length of bond in inches;

R = Resistance of one inch of cable or strands composing the bond;

CR = Contact resistance of bond terminals;

RF = Resistance of one foot of rail;

JR = Resistance of bonded joint expressed in feet of rail.

As most bond-testing instruments show the resistance of the bonded joint, as compared with the equal resistance of a certain number of feet of unbroken rail, it is more convenient to express this value in such terms than in ohms.

RESISTANCE AND CARRYING CAPACITY OF RAILS
Figures Based on Rails Having a Ratio of 12 to 1, as Compared with Copper, and at 70° F.

Weight, Lb. per Yd.	Resistance, Ohms per Ft.	Carrying Capacity in C.M.
16	0.0000622	169.764
20	0.00004923	212.206
25	0.00003935	265.257
30	0.00003321	318.309
35	0.00002844	371.360
40	0.00002489	424.412
45	0.00002212	477.463
50	0.000019355	530.515
60	0.0000166	636.618

RESISTANCE OF SOLID TERMINALS
Figures Based on a Pressure of 15 Tons per Square Inch of Contact Surface

Diameters	Resistance, Ohms
1/2"	0.0000008
5/8"	0.00000064
3/4"	0.00000053
7/8"	0.00000045
1"	0.0000004

RESISTANCE OF BOND CABLES PER INCH OF CONDUCTOR
AT 75° F.

Size	Resistance, Ohms per In.	Capacity in Amperes
1/0	0.00000829	210
2/0	0.00000657	265
3/0	0.00000521	335
4/0	0.00000414	425
250,000 C.M.	0.0000035	500
300,000 C.M.	0.00000275	600
350,000 C.M.	0.0000025	700
400,000 C.M.	0.00000219	800

To illustrate the use of the above formula and tables, assume that a 40-lb. T-rail is to be bonded with com-

pressed terminal flexible cable bonds, 4/0 capacity, 3/4-in. terminals, 26 in. in length. The resistance of each joint when the bond has been installed is desired. By referring to the tables, the resistance of one inch of 4/0 cable is found to be 0.00000414 ohm, and the resistance of a 26-in. bond is 26 times 0.00000414, or 0.00010764. The resistance of a 3/4-in. terminal is 0.00000053 ohm, and of the two terminals is 0.00000106 ohm; adding the cable resistance and the contact resistance the total ohmic resistance of the installed bond is 0.0001087 ohm. To express this in terms of equivalent rail length, divide by the resistance of one foot of 40-lb. rail, and the resistance of the bonded joint will be found to equal that of 4.2 ft. of unbroken 40-lb. rail.

SPLICE BARS DO NOT HELP MUCH

Trials made with standard bond-testing instruments show that when bonds are installed with reasonable care, the resistance of the joint will very closely approximate this calculated resistance. Abutting rail ends and clean tight splice bars may slightly lower the resistance of the joint, but this is quite negligible and should be disregarded.

Numerous tests made of complete haulage roads, installed under usual mining conditions, show that an average will vary but a fraction of a foot from the calculated resistance.

The use of the tables will not only be found of benefit in learning standards to test individual joints for their efficiency, but they can be used to great advantage in figuring voltage drop on proposed work.

In calculating voltage drop on a circuit composed of a trolley and a rail return, a formula is generally used which is correct for the copper loss, but does not take into consideration the weight of the rail and the size and length of the bonds. By calculating the voltage drop on the trolley and feeders only, and then on the rail, when properly bonded, the exact drop for a given load is secured. This method has been found particularly advantageous where a potential of 250 volts is used and the current transmitted over long distances, as is common with bituminous mines.

For instance, taking the example mentioned above, assume that a road 3000 ft. long is to be bonded, and the actual drop on the return side of the circuit is desired. With 30-ft. rail lengths, there will be 100 joints on one rail, having a total resistance of 420 ft. About 10 per cent. should be added to the joint resistance to take care of short rail lengths and bonding at switches.

Then the resistance of one rail will be equal to that of 3460 ft. of unbroken rail, or 0.00836394 ohm, or for the two rails in parallel 0.00418197 ohm. The voltage loss on the return side is the load times the resistance, then by calculating the drop on the trolley side, the exact drop on the circuit is easily ascertained.

In the same manner, these tables can be used to test the efficiency of the bonding of an entire haulage road or a certain section. With voltmeters at both ends of a section and an ammeter on a locomotive, the voltage drop

*Scranton, Penn.

at a certain load can be learned. It is a simple matter to calculate the drop on the positive side of the circuit and on the return side, assuming the bonds are in good condition. Any difference found will be an increased joint resistance, and the individual bonds should be tested with a bond tester and the defective ones replaced.

A number of companies have adopted this method, as an entire mine can be gone over on an idle day or night, and the individual joints need only to be tested in those sections which show defective bonding.

Mine operators who are desirous of obtaining efficient and economical results from electrical mining equipment will find it well worth their while to make such tests following them up with any necessary repairs.

One company recently tested in this manner a newly bonded road. The test showed that the joint resistance was 69 per cent. of the total circuit resistance, where it should have been only 8 per cent. Upon making an examination of the road, it was found that the track men had neglected to install bonds at two of the switches.

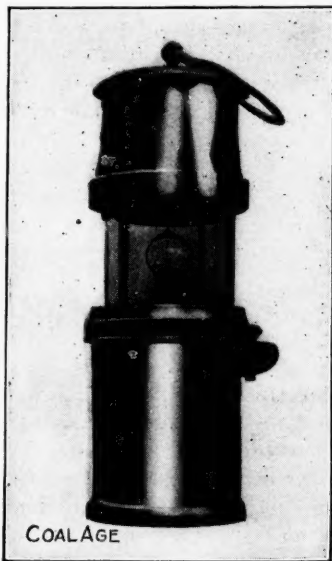
As their load was heavy, this unnecessary resistance would have cost a considerable sum in a month's time for power, which in this instance was purchased, even though it had not increased, as it undoubtedly would have done.

Combined Electric Lamp and Gas Tester

An underground electrical engineer, Thomas Heaton, of Wigan, Lancashire, England, has invented a miner's electric lamp, in the base of which is an accumulator. The upper part of the lamp consists of a top plate or cap, which screws onto the base. Both the lamp bulb and the gas detector are protected by inclosing them within a

glass tube or cylinder. A turning movement given to the lower portion of the lamp switches either the electric bulb or gas detector out of circuit at will.

The latter consists of a wick placed near a resistance wire or bridge of platinum or nickel-chrome. This is supplied with an inflammable oil or spirit, which is stored in the top plate of the lamp. When the wire or bridge is heated by the passage of a current, the wick ignites and can be used for testing. The lamp top is fitted internally with double-



COALAGE

A GAS-TESTING ELECTRIC LAMP

wire gauze cones, one overlying the other.

ADVANTAGES

It will be seen that Mr. Heaton's lamp is intended to provide either an electric light for the use of the miner or an oil flame for use as a gas detector, as may be de-

sired. The claims he makes for his lamp are reproduced as follows:

There is no danger of sparking should the lamp be struck by or come into contact with metals, such as picks or spades, rails, nails, etc. There is no danger should miners tamper with the lamp, as immediately they do so the light goes out, owing to the contact being broken. Should the lamp be unlocked and an attempt be made to unscrew it, the light will go out. There is no danger of a defective lamp getting into the mine, because if defective the lamp will not light.

The lamp will withstand any ordinary usage, and indeed may, without danger, be more harshly treated than the ordinary safety lamp. The lamp can be easily and cheaply maintained in good order and repair by the ordinary lamp-room staff. Used for lighting, the construction of the lamp is such that it will not ignite gas within or without. (To use as a gas tester, it is necessary to switch off the electric bulb and rotate the accumulator onto the contacts of the gas tester, which ignites the wick in the recess adapted and arranged for the gas testing only.)

The lamp battery is so constructed as not to be liable to form a short-circuit or to polarize, and as ordinarily tested, the lamp gives a light of 2 cp. throughout a period of 20 hours. The lamp gives a light all around in a horizontal plane. Its weight is only 4 lb.

The construction of the accumulator is such as to prevent escape of the liquid whatever the position of the lamp, though the gas generated by chemical action is allowed to escape freely. The cost and upkeep of the lamp are neither above the general average. The lamp can be manufactured with or without the gas-testing section, as desired.

It is so arranged that changing over from an electric lamp to a gas tester is readily accomplished by means of a loose collar. All the change needed is to rotate the lower portion of the lamp on its base collar, without removing the lamp top or exposing the light in any way. Used as a gas tester, it will detect a cap so as to meet fully the requirements of the British Coal Mines Act, 1911.

DRAWBACKS

In connection with the last claim, Mr. Heaton explains that in a simple experiment on the surface in coal gas he got a cap in as low a percentage as 1.5 per cent. Should the claims he makes be substantiated under severe tests below ground, the problem of efficient light for the miner may possibly be solved. However, the dangers of the safety lamp are accentuated rather than reduced, for evidently the miner is expected to relight his oil detector when he desires to test for gas and he may well do so in a dangerous atmosphere. The light moreover is well below the top of the lamp and so not in a good position for observing the roof, which is not true of electric lamps as now offered for sale.

☞

The right way to discover whether your furnace is giving results is to have a gas analyser or a CO₂ recorder and test for carbon dioxide. This test of the gases in a Babcock and Wilcox or Stirling boiler must be made in its various passes and in an ordinary return-tubular boiler must be made in the front or rear and not in the breeching or stack because it is the efficiency of the furnace as a heating agent which is in question and excess air entering beyond the heating surfaces interferes with the draft and does not affect otherwise the heating qualities of the furnace.

The Calamity Trail

BY C. W. CRAWFORD*

SYNOPSIS—A somewhat satirical soliloquy on the design and operation of steam engines with particular attention to those of the genus high speed; also a few remarks on the shortcomings of steam boilers, piping and separators and the ignorance and gullibility of coal operators in general.

✽

More reasons than bad design and bad construction may be assigned for the delinquency of steam engines. When an engine looks well and works quietly it goes without comment that it is doing good service. Fashion has much to do with forming such opinion, but everything is sacrificed to quiet running. It doesn't matter that the engine may have 6 per cent. clearance waste, or that it may be using 40 lb. of steam per horsepower per hour; it runs quietly at high speed and is, therefore, considered economical.

Piston speed is only considered in terms of revolutions per minute, without reference to the number of times during that period that the clearance is incurred. If the machine has a shaft governor, so much the better; it is up-to-date. Admirers of this class of engines maintain that high compression is no loss; that compression up to initial pressure is all given back in the next stroke. But where does the compression come from?

It's a funny game. Steam hits the piston a clip, knocking it endways. The flywheel gets the spent blow through the crank, meantime the eccentric takes a hand and shuts the steam off. The steam then tries to expand and in doing so knocks the valve open and gets out. Then the flywheel, having a good start, blocks the game at the other end and sets up a back pressure ahead of the piston, which gets another knockdown blow from the steam on top of the already high back pressure, which latter turns state's evidence just as the crank comes over the center. The governor acting as umpire keeps up the continuous vaudeville.

In this continuous scrap the piston is knocked back and forth between two buffers of back pressure, and the useful effect is derived from a little more than half the stroke, aided by the compression that is *given back*. The rest of the stroke is occupied by expansion of short duration, by the exhaust, and largely by compression and back pressure. The economy is found in the advertising matter of the builder.

It is true that economy is considered worth while in some localities, and some really efficient engines are built, but the majority are quite the reverse. It is believed the old fashioned engine of 50 years ago—the common throttling engine with a flyball governor—was just as economical as the present high-speed automatic, if not more so, when equally well made and run at high piston speed. Hoisting engines in coal mines are a fair example of the disregard of economy. These machines have probably as heavy duty as any class of engines in the country. Hoisting three tons at a trip from mines 300 ft. deep, in 7 to 15 sec., requires a strong pull and very quick handling.

*President Crawford & McCrimmon Co., Brazil, Ind.

OUTPUT NOT EFFICIENCY IS PRIME REQUISITE

To get coal rapidly and cheaply is the ambition of every coal operator. Coal is cheap—at the mines—and a ton or two more or less per day burned under the boilers doesn't count. It is the large output that tells, and everything is made to lean in that direction. Therefore economy of coal or steam is little thought of. Engines are usually worked full stroke—or nearly so.

The improvements demanded are those that increase the output per day, and those that lighten the work of the engineer so that he may hoist more rapidly. Larger engines are being used every year, while old machines are made to do double duty. Automatic cutoffs are offered by builders, but seldom taken.

The mines are mostly shallow, and since the starting must be done at full stroke, there is little time during a hoist for cutoff and expansion. If lack of expansion were the only calamity attending the more aggravated instances, it might be condoned. But, water passing through the cylinders heated nearly to the temperature of the steam not only entails useless duty on the steam generators, but destroys lubrication, wastes the water after it has deposited its content of scale-forming material in the boiler, and discharges a large percentage of the heat derived from the coal into the atmosphere without its having contributed anything to the work in hand.

Practically all boilers send over more or less water in spray mixed with the steam. It sometimes happens in a set of boilers that the cleaning of fires lays off one or more of them at a time, compelling the others to keep up the quota of steam. It is possible at such periods of unusually hard firing for the violently boiling water to be drawn in a mountain of spray toward the outlet opening, and more or less of it to be forced into the pipe line. It is also even possible for water in considerable quantity to be caught occasionally, and when once started in the pipe, this is compelled to go through the cylinders—in the absence of an efficient separator—with what destructive effect every engineer is aware. It is generally not believed that water is thus carried over, but it goes over just the same.

During the old steamboat days, it was a universal custom to use domes, or drums, on all boilers as a preventive of the entraining of water over into the cylinders. These drums were very large—sometimes double drums were used. There was a supposition in those times that in hard firing, as was universal, the water might be drawn in a solid stream through the pipes and cylinders, exhausting the boilers and causing explosions, hence the use of large steam drums 3 ft. or more in diameter, reaching across the battery of boilers.

In these latter times domes are rated as a nuisance and are not furnished by boiler makers, except with a protest. A header line, more or less insufficient, is used instead to connect the boilers, fitted with a slim pipe connection to each unit. It is reasoned the large domes are conducive to condensation and loss of pressure—and are too expensive anyway.

The outlets of boilers have grown so small in recent years that the steam is forced to travel at the rate of

two miles a minute when boilers are pushed to capacity. The standard nozzle opening of a 72-in. by 18-ft. boiler is 6 in. in diameter. Is it worth while to notice that slugs of water are sometimes carried over and engines wrecked?

The calamity that follows the slugging of water through the cylinders is more far-reaching than the mere matter of economy, which is serious enough. Smash-ups are often attributed to any other cause than the right one, and it is generally disputed that water in the cylinder has anything to do with them. But such accidents do occur when it is known the weakest point in the engine, if any can be called weak, has a factor of ultimate strength of 200 times the greatest pressure in the cylinder of steam, not water.

WHY SMASH-UPS OCCUR

From whence comes the terrific pressure that breaks bedplates, cranks, crossheads, pistons, and loosens crank-pins, cranks, winding drums, etc.? Not from direct steam pressure, but from solid slugs of water carried over from the boilers. It will be noted that when the exhaust is closed near the end of the stroke, the water is trapped and the piston moving toward it. Followed by the piston, which is impelled by the momentum of the 10- or 15-ton winding drum revolving at a speed of 100 r.p.m., the water's only escape is in tilting the valve and being forced back into the steam chest. This occurs at the toggling point of the crank where its force is practically infinite. It will be noted also that while the water has an avenue of egress, the concussion comes so suddenly that it hasn't time to escape. Hence a trail of wreckage involving possibly a new engine.

Yet engineers and operators persist in doing the same thing over again. The prime mover in this train of calamity is the boiler maker, who furnishes the cause. The engineer fails to use a large enough header line, and installs an insufficient separator, or none at all, and the operator who is ignorant of it all pays the bills.

Lack of domes or their equivalent on boilers, attenuated steam pipes and the absence of separators of sufficient and efficient capacity is the cause of it all. A separator is not particularly costly. There is but one principle upon which it can be made efficient and that is rarely used. That is by employing gravity as its chief characteristic. The market is full of splash-board separators, which make the users wise until some accident makes them a little wiser. But why depend upon a separator alone? Why not begin at the boiler and separate by a dome or a dry pipe or otherwise—anyway the water is better to be in the boiler than in the engine.

A Mine at the Panama-Pacific Exposition

At the request of various mine operators and the Exposition, the U. S. Bureau of Mines has undertaken to construct, in coöperation with the mining industry and the manufacturers of mining machinery, a mine beneath the floor of the Palace of Mines and Metallurgy at the Panama-Pacific Exposition, San Francisco, next year.

The financial and operative success of the mine is assured through exhibits promised as shown below, whereby typical metal and coal-mining operations will be reproduced by full-size working places, in which mining ma-

chinery will be installed and operated. The walls of the mine will be covered with either ore or coal typical of the mine illustrated. Among others, the Copper Queen Consolidated, of Arizona, Bunker Hill-Sullivan Co., of Idaho, Homestake Mining Co., of South Dakota, Goldfield Consolidated Mines Co., of Nevada, Jones and Laughlin Co., of Michigan, Lehigh Coal & Navigation Co., of the anthracite field of Pennsylvania, Pocahontas Fuel Co., of West Virginia, Consolidation Coal Co., of Kentucky, and Pacific Coast Coal Co., of Washington, have each agreed to reproduce one of their working places or stopes and to contribute the sum necessary to the installation and operation. Tentative promises of similar action have been received from the Rock Island Coal Co., Peabody Coal Co. and Pittsburgh Coal Company.

Various mining machinery and appliances have been promised, including a mine cage and cars by the Joshua Hendy Co., a cage, hoist and motor, by the Denver Engineering Works, locomotives by the Westinghouse Electric & Manufacturing Co., pumps by Byron Jackson, air compressor, drills, drill sharpener and winze hoist, by the Compressed Air Machinery Co., drills and coal cutters by the Ingersoll Rand Co. and the Sullivan Machinery Co., lamps by the Justrite Manufacturing Co. and the Koehler Manufacturing Co., enamel signs by Stonehouse Enamel Sign Co. There is little doubt that other necessary machinery and appliances, such as safety lamps, portable electric lamps, fan, mine telephones, mine rescue apparatus, switches, track, etc., will be received as exhibits.

The entrance to the mine will be through the Bureau of Mines space, and visitors will be attracted to it by being given portable mine lamps, and by being lowered in a very slowly moving cage while a panoramic effect of the strata lining a mine shaft will pass by them so rapidly as to produce the illusion of descending to a considerable depth. In case of crowds, these may enter by a slope. Exit will be by a slope into the radium booths of the Bureau of Mines where actual radium examinations will be shown.

There will be a motion-picture room which visitors will pass in going from mine to mine. In it will be shown such great open workings as are not illustrated by the underground mines, such as those of the Utah Copper Co. and those of the Nevada Consolidated Co., at Ely, the iron diggings at Hibbing, Minn., hydraulic gold mining, and the quarrying of building stone.

Twice each day there will be an imaginary explosion or fire in some portion of the mine announced by telephone to the superintendent's office in the Bureau of Mines space on the surface, and rescue men wearing breathing apparatus will enter the mine and bring out supposed victims who will be given first-aid treatment in the surface emergency hospital.

In the Bureau of Mines space on the floor of the main building, there will be, in addition to the radium booths, exhibits of carnotite, pitchblende and other radium ores, their alloys and concentrates, an emergency mine hospital and smoke room for rescue training, exhibits of fuel efficiency, smoke abatement, explosives, mine-welfare work, etc.

The prime purpose of the mines will be that of educating the investing public, stockholders, members of legislatures and the uniformed antagonists of the industry relative to the importance of the mining industry, its extent, variety and the cost of operation.

The Necessary Training of Mine Officials

BY P. J. BRENNAN*

SYNOPSIS—In the past many ignorant and unscrupulous officials have made a reputation for themselves at the expense of their employers by "hogging." The day is probably coming when only men of integrity, who are fitted for their particular work by education or experience can secure or hold a position of trust or responsibility.

✂

The magnitude and importance of the mining industry of West Virginia is sufficient justification for our pausing to consider the qualifications of those on whose shoulders fall the responsible and sometimes onerous duties of supervision and management.

According to the annual report of the Department of Mines for the year ending June 30, 1912, there was mined in the state 59,581,174 long tons of coal. This production found employment for nearly 70,000 persons, and necessitated the investment of a considerable amount of capital. The tonnage, the number of employees and the capital invested have been steadily increasing from year to year, and the high point has not yet been reached.

New mines are being opened, mostly shafts of various depths, and consequently more difficult to be safely worked than the older drift mines, and many companies are remodeling their old plants, tearing out all obsolete equipment, and replacing it with the most modern and efficient machinery obtainable. And all this with a view to improving in the near future upon the continued progress for which the coal industry of the state is already noted; yet withal, there is one extremely important element in the operation of the mine that is being overlooked, and that is, the training and preparation of the men who are to be the official staff, upon whom will depend, to a considerable extent, the safety of those 70,000 or more employees, also, the success of the operation and the security of the capital invested.

It is unreasonable to expect more than a minimum of efficiency from the efforts of any man who is placed in charge of a mine operation, without having at least an elementary training in the art and science of mining.

Many of the ruined mines, with their consequent high cost of production, are due to the mismanagement of officials who had neither the necessary knowledge nor ability to fulfill the duties to which they were appointed. Sad to relate, some such officials have succeeded in building up for themselves reputations as large tonnage getters by surreptitiously hogging and ruining mine after mine.

One such individual once informed the writer that the most successful officials were those who could hog out the largest tonnage and get away before the evil effects of a squeeze and closed air courses began to show. Such men are a menace to the mining profession, and can only be eliminated by a general raising of the standard of competency for all grades of officials, from the fireboss upward.

THE FIREBOSS AND HIS DUTIES

The fireboss is an important factor in the safety of a

mine where methane (CH_4) is given off in any quantity, but his ability to recognize a blue cap on his lamp, as certainly indicative of firedamp, ought not to be a sufficient reason for intrusting to his care the safety of a mine and those employed therein.

He should be able to read and write sufficiently well to permit of his making out an intelligent report of the conditions he has found existing. He should, also, have a good knowledge of the properties of the different gases given off in a mine. He should have a competent understanding of the barometer, thermometer, water-gage and hygrometer, as used in connection with mining. He should not only have a perfect knowledge of the use of a safety lamp, but should know, also, why it is a safety lamp, and what makes it so. The state mine law says, "He shall have a practical knowledge of the subject of ventilation of mines, and the machinery and appliances used for that purpose." Why should he not know, also, something about the theory of ventilation?

The next official above the fireboss is the mine foreman. The mine law of the state describes his duties, so far as complying with the law goes. A knowledge of the mine statutes, as printed in the book, is, I believe, about all that is necessary in order to secure a certificate.

Now, the foreman is a very important factor in the successful operation of a mine. It is he who, more than any other official, influences the length and weight of the payroll. It is he who may pay out considerable sums of money in a year for which the operator may receive little or no return. It is he who, if not "onto his job," pays for work that is unnecessary, and leaves work undone that is important. It is he who is responsible for the protection of the life and limb of every man in the mine (and this is where he has his hands on the purse strings of the state through the Compensation Law). It is he who is also responsible for the drainage and ventilation, and the pumps and machinery appertaining thereto. It is he who, through carelessness or want of knowledge, may be the cause of making widows or orphans. It is he who is responsible for the output. It is he who, in his anxiety to secure a large tonnage at a low cost, may unwittingly hog away 40 per cent. of the coal, and lose the other 60 per cent.

In fact, it is the foreman who is responsible for the prevention of every accident or injury to both person and property. It is he who is in absolute control of everybody and every appliance in the mine, and has the power to hire and fire at will.

Anybody outside the mining profession would conclude that the official having so much authority and carrying such heavy responsibilities, must surely be of more than the average intelligence, and of considerable technical knowledge. But, we who are in the business know that he is in some cases a man with little or no education, and without any technical knowledge whatever.

THE QUALIFICATIONS OF A MINE FOREMAN

In the writer's opinion, a mine foreman should have at least five years' practical experience in the mine, one

*Coketon, W. Va.

Note—Paper read before the West Virginia Mining Institute at Cumberland, Md., June 2, 1914.

year of which should be as assistant foreman. He should also have a fair school education and a reasonable amount of technical knowledge. His examination should consist of the following subjects:

1. Reading and writing.
2. Arithmetic, including square root.
3. The mining laws of the state.
4. A knowledge of permissible explosives and shot-firing.
5. Knowledge of the various systems of working.
6. Use of the barometer, thermometer, anemometer, water-gage and hygrometer.
7. The properties of gases met with in the mine, and the ordinary methods of ventilation.
8. Timbering roadways and working places.
9. A practical knowledge of the machinery used for ventilating, pumping, hauling and coal cutting.
10. A knowledge of first-aid to the injured. The writer's experience is that all these subjects are very interesting studies for the practical miner who is ambitious of joining the official rank.

Between the operator and the mine foreman, an official called the superintendent, is usually appointed. His duties are to see that the foreman gets all the necessary supplies for the proper operating of the mine, to assist the foreman in the proper and economical use of material, and by inspections and consultations, advise and assist in the economical management and safety of the mine. At the same time he must not forget to keep both eyes on the cost sheet.

If the superintendent is to give his employer a maximum of efficiency, he should know the mining business from A to Z. He should have such a knowledge of it as can only be obtained by hard work and study. He it is who should be able to advise and direct the foreman in the many complexities that cross his path from day to day, and should be competent to be a leader and not a follower. Yet, many serious and costly errors are made from time to time by superintendents, who are doing their utmost to do right, but fail through lack of knowledge of the business they are trying to run.

An amusing incident occurred some time ago in this state which proved to my satisfaction that technical training was necessary for a superintendent. The principal actor in the incident was the superintendent of a large number of mines. He had never seen a water-gage, and did not understand how it worked. One day, however, the mystery was explained to him, and fully demonstrated by a borrowed water-gage being placed on the door of one of his fan drifts, where the fan was running exhausting. The water-gage registered 2.8 in.

This difference in the level of the water in the two legs of the gage evidently set the worthy gentleman to thinking, for in a few days afterward a quantity of 2-in. pipe was delivered at one of his mines and promptly put together from the fan race to a swag in the air course where a pool of water lay.

Well, I don't suppose that superintendent knows yet why the fan did not pull that water out of the air course. Of course, he lost nothing, but the company paid the bill, as it no doubt has done with many others, for foolish experiments, performed through want of training and knowledge on the part of officials.

THE SUPERINTENDENT'S TRAINING

We may differ as to the necessary training for a mine superintendent. The writer, however, believes he should have the following qualifications:

1. He should be at least 25 years of age.
2. He should have had five years of practical experience in a mine, or three years' practical experience and two years at the mining and mechanical section of the State University (or its equivalent), and should be able to pass an examination in the following subjects:
 1. Elementary chemistry in all its practical bearings upon the gases in the mine.
 2. The use and various types of safety lamps.
 3. Coal dust as an explosive agent.
 4. Knowledge of permissible explosives and shot firing.
 5. Practical and theoretical ventilation.
 6. Underground management.
 7. Shaft sinking and drift opening.
 8. Geology.
 9. Mechanical engineering as applied to mining machinery.
 10. Practical knowledge of electricity as applied to mine machinery, and a good knowledge of mathematics and surveying.

Most operations with a number of different plants and superintendents, appoint an official as general superintendent, who has control over all superintendents and operations, and usually the chief executive of the operating end. He should be a man possessed of a good sound education, and an abundance of common sense and good judgment. Otherwise, it would be impossible for him to analyze the results of the different superintendents and plants, and classify them according to the conditions prevailing at the different works, it being a well known fact that no two plants are operated under the same conditions. There are from time to time many difficult propositions that are brought before him for discussion and decision, making it necessary that he should have a technical knowledge equal, if not superior, to that of the superintendents under him.

As a rule, the general superintendent is kept with his nose to the grindstone more hours per day than any other official on the job. It is sometimes said of him that the only pleasure he gets, is that derived from drawing his blue pencil across a bunch of requisitions, and imagining what the other fellow feels like when he finds it out.

He should be an excellent judge of character, and capable of getting the best out of the men under him, and sufficiently broad minded to, at times, bear with the other fellow's weaknesses.

He should not discriminate against those under him who don't happen to belong to the same lodge, or sing in the same church choir, or because Mrs. Smith is not on visiting terms with Mrs. Jones. He is the one man from whom all others, from the trapper to the superintendent, expect to receive a fair and square deal.

TWO OBJECTIONS TO STANDARD RAISING

In discussing this question of raising the standard of mine officials with mining men who are interested, among other objections, the following two are the most notable:

1. If you raise the standard of qualification, a movement for increase of salaries will inevitably follow.

2. Technical education is impossible for the man who has not the time and the means to allow of his going to the State University.

The first objection is almost too absurd to be taken notice of, as I am confident that such a movement would never be necessary. There would be created an absolutely new type of official, instead of the class who now hold the offices, because there is no one better to replace them, and whose principal interest in the matter is payday.

We would see a more intelligent and able class, a class imbued with ambition, a just pride and determination to excel in the profession they had undertaken to study.

The employer would find a reduction in his bill for supplies, brought about by a more careful use of material and the prevention of waste. Mines would be better kept up, air courses would be kept open, and such men, themselves disciplined, would maintain better discipline in the mines. Consequently, fewer accidents to person and appliances would occur, all of which would tend toward producing an increased tonnage at less cost. The employer would not be slow to notice such improvements, nor would he be likely to allow such men to go long without proper recognition.

As to the second objection, why should it not be possible for working men to get a technical training, such as would fit them for promotion to official life in their calling? This is within the power of the State of West Virginia. Furthermore, it is the duty of the state to give its workers a fair opportunity to acquire a technical education, and improve their position in life and their usefulness to the commonwealth at large. It is true the state provides a university fairly well equipped for teaching mining, and kindred subjects, but the people who require the teaching most are not in a position to avail themselves of this provision.

The state could and should establish a technical-education board, to be appointed by the governor. Such board should be provided with sufficient funds with which to establish technical schools in suitable centers of the mining and other industries, and provide sufficient capable lecturers for teaching weekly evening classes during the winter months. County or local committees could be appointed to supervise the work under the state board.

I imagine someone asking, but where is the money to come from? The state can always find money for any good purpose, and in the matter of technical education, it would be an investment that would return over 100 per cent. interest. Not all men who studied would be found sufficiently competent to fill the posts of their ambition, but all men who studied would be the better therefore, and the state would be so much the richer.

It is more than probable that if our working miners were given a reasonable opportunity for improvement and advancement, they would settle down in the State of West Virginia and cease to be a migratory element.

In conclusion, I desire not to be misunderstood, as I know full well that many men who have been called upon to manage mines in the past were shrewd, fairly intelligent and capable men. What they lacked in technical education, they were compelled, by the sheer force of circumstances, to supply by observation and practical experience. This they often did and did it well.

Extracts from a Superintendent's Diary

We had some women visitors in camp today; a party of social settlement workers from the city. As usual, most of the sarcasm was aimed at the multi-millionaires' representative, the "super." Ordinarily the sarcastic remarks of outsiders are about as amusing to me as feature stories in Sunday papers, describing canary birds as safety lamps, but today I partially lost my temper and as a result, I fear at least one young woman carried away impressions of the camp's superintendent that quite tallied with her previously formed opinion of such monsters.

The party was at my house being entertained by my wife; they had been tramping for an hour or so about our tenements, when my wife sent them an invitation to come over and rest a while on our shaded porch and enjoy such refreshments as our cook could improvise. Being proud of our tenements and especially of the sanitary condition of our camp, as compared to most other camps in our section, I foolishly journeyed over to the house expecting to hear some pleasing remarks about the result of our efforts.

Just after I arrived on the scene and before my wife had an opportunity for introductions, one young lady looking straight at me, but addressing her remarks to my wife, piped out something that meant: Doesn't your conscience trouble you when you look out over the camp and compare the wretched dwellings of the miners to this comfortable home furnished you by the mine owners?

Just what followed won't be recorded in this diary, I might be tempted to repudiate it some day; but now that I've mentioned my residence, in the diary, I can't resist the temptation to record a few random occurrences.

Whenever I am compelled to discharge a married man, his wife and children (and a few of the neighbor's children) proceed to our mansion's back door and my wife is assured that if the family starve, their souls will be on my head. Once I suggested to my wife that if a certain man were allowed to return to work, the effect on our discipline would endanger a thousand men's lives and the responsibility would be on my head without question; she still recalled the discharged miner's wife so vividly that my picture was wasted.

When the love knots of our younger residents become hopelessly entangled, the victims always follow the trail that leads to our back door. Nothing especially terrifying about that, as it is written, but when we consider that our young people are of many nations and religions with various and sundry ideas of morality, it sounds different.

Some of the stories that my wife repeats to me are almost unbelievable, and I am almost persuaded that she doesn't always tell me the worst.

The widows and the orphans—there are always many of them around coal-mining villages; and until our compensation laws become perfected, many of them must suffer grievous wrongs and, in consequence become rebellious. To them our mansion is only too often the visible connection to the iniquitous corporation which has brought on all of their misfortunes and, in consequence, our charities are judged, not by our ability, but by the capitalization of the corporation. It's hard, indeed, to offer assistance beyond your means and receive in response a malediction. And so it goes; but this is enough for today.

What Shall Be Considered Maximum Recovery?

BY A. W. HESSE*

SYNOPSIS—The percentage of recovery varies widely in different fields and frequently in the same locality strongly divergent results are obtained. High figures secured in one field may not necessarily be a criterion for another, even though physical conditions may be similar.

Σ

The Bureau of Mines informs us that probably one-third of the bituminous coal now worked is left underground by our present methods. In other words, the average recovery in bituminous fields is only about 67 per cent.

What will the next 10, 20 or 50 years show? Surely, if not better by the end of the latter period, there is little hope toward eliminating these losses.

What are the "most modern and approved methods of mining?" Apparently they are like our warships—modern today and obsolete a year hence.

In order to get an idea of what is being accomplished in other fields, inquiries were sent out to different sections of the United States. The results are shown in a condensed form by the accompanying table.

You will note on this table, the wide variation of percentages given for different districts in various states. All are large producers of coal, with one or two exceptions, and employ what are presumed to be modern methods of mining. It is noticeable that the thin seams usually are overlaid with good roof; and the percentage of recovery is high. Also, that but one operator expects the ultimate recovery to fall below his present percentage.

SOUTHERN COLORADO SECURES 80 TO 90 PER CENT.

In the southern Colorado field, where the roof and bottom conditions are favorable for pillar drawing, no roof coal is left for protection and the recovery is given as 80 to 90 per cent., working on the room-and-pillar system. It is claimed that in the Cañon City district, where the longwall system is used, that 100 per cent. of the seam is recovered. This is in the thinner seam, which measures about 3 feet.

The coal in this section of the country belongs to the Cretaceous series and the intrusion of dikes should affect pillar drawing considerably, inasmuch as they would make more difficult the breaking of the overlying strata.

Rooms in the southern Colorado district are driven 16 to 18 ft. wide on 45-ft. centers, while in the Walsenburg district, where the coal is harder and has less cover, rooms are driven 35 to 40 ft. wide, leaving the same thickness in pillars which are recovered by machine and pick work. Track is laid on each side of the room and frequently one or two cuts are taken off the side of the pillar with a machine before beginning pick work.

The bottom of the Colorado seams is usually slate of a soft character, which heaves when weight is thrown onto the pillars, making it necessary frequently to drive a skip

along the pillar in order to reach the back end before beginning to draw it.

There are districts where both roof and bottom conditions are unfavorable and much difficulty is encountered in breaking the overlying strata. In these sections the recovery is estimated to be 60 to 65 per cent.; 15 or 20 per cent. is lost in roof coal because the strata next overlying the coal cannot be propped.

With the conditions just given, and most of the operations advancing under heavier cover, do you believe the present recoveries will be maintained?

Another company, operating in practically the same field, states its recovery runs 75 to 80 per cent. of the entire seam, while a higher ultimate recovery is expected. This firm is now driving room entries to the boundaries and the last rooms are worked first, thus making it possible to draw the pillars on the retreat.

In the Michigan field, especially in the Saginaw district, the coal is in pockets rather than a continuous seam. The basin lies for the most part in a low, flat country, and shafts about 200 ft. deep are necessary to reach the coal. The bed averages about 3 ft., and is of poorer grade than the Ohio and Pennsylvania fuels, so that its market is somewhat limited.

The top in these mines is usually black slate, while one mine has a fireclay roof, making it necessary to leave top coal. Yet rooms are driven 40 ft. wide with track along each rib. The length of the room is 150 ft., as the miner pushes his cars from the working place to the entry. With the conditions just given, the recovery claimed is between 80 and 90 per cent. The 65 per cent. recovery given in the table (Item 4) represents the result of leaving pillars for surface protection within the city limits.

ADVERSE PUBLIC SENTIMENT AFFECTS SOUTHERN ILLINOIS

Going into central Illinois fields, where the No. 6 seam is operated extensively, we learn of adverse public feelings and unsettled industrial and labor conditions, which materially affect the percentage of recovery. Surface costing \$100 to \$250 per acre costs the operator two or three times these values in cases of subsidences, if the mining rights do not clearly cover the property. Besides these factors, the companies operating in the Glen Carbon, Mt. Olive and Divernon fields, state that owing to thick, soft clay under the coal or great overburden (300 ft. to 400 ft.) that they do not recover more than 50 per cent. In the southern fields better results are claimed, since the cover is about 110 ft. thick and all soft.

The slightly inferior seams of coal above or below the Nos. 5 and 6 seams are now receiving considerable thought as to future values, and for this reason they are trying to prevent roof movements by leaving sufficient pillars.

In the Sherrard field of Illinois, the recovery is reported at 90 per cent. Here the top and bottom are good and conditions propitious for drawing pillars. The seam of coal is only 3 ft. 8 in. thick, with many clay veins run-

*Assistant engineer, Consolidation Coal Co., Fairmont, W. Va.

Note—Read before the West Virginia Mining Institute, Cumberland, Md., June 3, 1914.

ning through it, which evidently must affect recovery to some extent.

An inquiry sent into the southwest section of Pennsylvania shows a recovery of 72.5 per cent. Here, 10 in. of roof coal is allowed to remain on account of drawslate and the operations for the past three years have been under the plant and town.

The bottom in this mine is fireclay of rather soft character. The rooms are driven from both sides of entries on 60-ft. centers and widened to 21 ft., leaving 39-ft. pillars to be drawn by machine and pick work. By this method, the ultimate recovery is expected to show a material increase over that given.

The company reporting from Westmoreland County, Pennsylvania, where conditions seem favorable, both in the steam- and gas-coal fields, shows a recovery of from 82 to 86 per cent. of the entire seam; and expects the ultimate recovery to fall below these figures.

In Somerset County, Pennsylvania, where coals of the Allegheny series are worked, the recovery is given as 94.75 per cent. of the entire seam. Here, excellent roof and bottom conditions prevail, and I understand that all room headings are driven to the limit before any rooms are driven at all. Then, the rooms are started at the rear and pillars drawn as soon as these are finished.

Practically the same conditions exist in the George's Creek field in the Sewickley seam, only the recovery is reported as 97 per cent. In this same field, the results obtained in the "Big Vein" or Pittsburgh seam, show 88 per cent. Considerable propping is necessary, owing to the drawslate and the wild coal just above it. The systems of mining the coal in this field have changed from time to time until now headings are driven 9 ft. wide, rooms only 13 ft. wide and the distance between room centers maintained at 100 ft., thus providing against squeezes. Under this process, 90 per cent. extraction is expected.

PILLARS ARE NOT DRAWN IN OHIO

In Ohio, as well as some parts of West Virginia, no attempt is made to draw pillars at all. Rooms are driven 25 ft. wide with 8- to 12-ft. pillars between. In one of the largest mines of Belmont County, rooms were driven from both sides of the headings and it was no infrequent occurrence to have a territory squeeze shut, leaving considerable blocks of coal between the ends of unfinished rooms. In this mine, 50 per cent. would approximate the recovery.

In Harrison County, Ohio, it is nearly as bad. The recovery is reported as 70 to 75 per cent., but the same conditions exist in this section as in Belmont County, excepting perhaps the driving of rooms both ways from the same entry. The Ohio Mining Commission found in its recent investigations that 30, 40 and as high as 50 per cent. of coal is being left underground as pillars in that state.

There are mines in West Virginia which show recovery from 85.6 per cent. to 99.8 per cent., the highest percentage resulting from the fact that all the work was in the solid. These figures were presented by W. A. Grady, of the Pocahontas Coal & Coke Co., at the last meeting of this institute at Charleston, W. Va. The average result of the figures presented for 10 mines showed about 92.6 per cent.

The foregoing figures reveal what is possible, at the

TABLE OF PRINCIPAL FACTORS GOVERNING RECOVERY OF COAL IN DIFFERENT DISTRICTS

Item	Operating District and State	Per Cent. of Recovery of Entire Seam	Ultimate Recovery Compared to Present	Period of Operation, Years	Average Height of Seam	Roof Coal Carried	Nature of Top	Nature of Bottom	System of Mining	Are Pillars Drawn	Clay Veins Encountered	Remarks
1	Southern Colorado	80-90	Same	5 to 30	8' 6"	0 to 24"	Slate	Soft slate	Room and pillar	Yes	Dikes	
2	Colorado (other Districts)	60-65	Same	5 to 30	8' 6"	18" to 24"	Very soft	Soft slate	Room and pillar	Yes	None	
3	Colorado (other Districts)	75-80	Better	10 to 35	3' to 7'	18" to 24"	Sandstone, poor shale	Same as top	Room and pillar	Yes	None	
4	Saginaw District, Michigan	65, 80-90	Better	15	3'	1 of 10	Black slate	Fire clay	Room and pillar	Where allowed	None	Length of room—150 ft.
5	Central Illinois	50	Same	20	8'	None	Slate, clod and limestone	Fire clay	Panel system	None	None	Advocates retreat mining.
6	Southern Illinois	65-70	Same	20	8'	Yes	Sandy shale	Fire clay	Panel system	To some extent	None	No. 6 seam.
7	Springfield District, Illinois	55-75	Increase*	20 to 25	6' to 7'	Some places	Hard shale	Fire clay	Room and pillar	Where allowed	None	*Adjustment of labor situation.
8	Franklin, Williamson and Saline Counties, Ill.	55-75	Increase*	18	5 1/2'	Some places	Hard shale	Fire clay	Room and pillar	Where allowed	None	
9	Sherard Field, Ill.	90	Same	20	3' 8"	None	Blue rock and cap rock	Slate & sand rock	Room and pillar	Yes	Yes	
10	Extreme Southwest Section, Penna.	72 1/2	Better	3	7' 6"	10"	18" to 3' 0" draw slate	Soft fire clay	Room and pillar	Yes	None	
11	Penna.-Westmoreland Co.	84	Below	25 to 35	6' 8"	None	Slate	Fire clay	Room and pillar	Yes	None	
12	Penna.-Somerset Field	95	Same	8	3' 11"	None	Hard black slate	Limestone	Room and pillar	Yes	Very few	Projected work adhered to.
13	Maryland-Georges Creek Field	97	Same	12	3' 0"	None	Sand rock	Sand rock	Room and pillar	Yes	Yes	Sewickley seam
14	Maryland-Georges Creek Field	88	Same	94	9' 0"	18"	Gray shale, coal, dark shale	Hard gray shale	Room and pillar	Yes	None	
15	Ohio, Belmont County	60	Same	5' 6"	3' 8" to 5' 0"	None	Slate and shale	Fire clay	Room and pillar	None	None	
16	Eastern Ohio, Harrison County	70-75	Same	50	8'	Some places	10" firm slate	Fire clay	Room and pillar	Yes	Yes	
17	West Virginia	90	Same				Varies	Fire clay	Room and pillar	Yes	Yes	
18	Alabama											
19	Tennessee											
20	Kentucky											
21	Kansas											
22	Iowa											

No reply

same time showing what is actually, presumably, being accomplished. Shall we assume that because the United States Coal & Coke Co., at Gary, W. Va., is recovering 95 per cent. and more of the coal in which it is operating, that this should be accomplished in the districts of Colorado, showing only 60 to 65 per cent.?

None of us, I am sure, would accept an average of the percentages here given as a fair maximum, nor even an average of the same field. It is unfair to compare ultimate recovery of mines now drawing to a close with those mines at the best of their production. No doubt, the systems under which they were inaugurated were considered modern, but they would not be considered so now.

From reports sent in, it is apparent that there are five factors limiting the possible recovery in these fields; namely,

1. Mining rights and public feeling.
2. Roof and bottom conditions.
3. Weight and character of overburden.
4. Labor conditions.
5. Market value of the coal.

1. Where the mining rights do not allow breaking of surface, the recovery naturally varies inversely in some ratio to the overlying weight.

2. Where roof and bottom conditions make it necessary to recover as quickly as possible, market conditions will affect recovery; for pillar work of this kind will not wait.

3. Weight and character of overburden require systematic mining and competent supervision.

4. It is a matter of what is next best when unions insist on conditions which increase both cost of operating and loss of coal.

5. The market value of the coal dictates how far any of us can go toward its recovery.

STRAIGHT RECOVERY FIGURES ARE MEANINGLESS

These points are mentioned because we are apt to compare straight figures of recovery without taking into consideration the conditions under which they are derived. The Ohio Mining Commission, for instance, uses the mines and operations at Gary for an example of what Ohio should follow. Conditions, however, are so different in these two localities, that to secure the same results in recovery would require several radical changes. Generally the roof in Ohio is poor, union scales require rooms entirely too wide for economic pillar drawing, the general labor situation is always more or less unsettled and the selling qualities of the coal are inferior to those of the Pocahontas seam at Gary.

There are always other conditions which affect good pillar recovery, three of which were given by H. V. Hesse, in his paper read before this institute at Charleston, W. Va., Dec. 1, 1908; namely: (1) Insufficient or incompetent engineering; (2) incompetent management, and (3) impatience of owners for quick returns.

Maximum recovery in any one mine is hardly to be based on what is being done in some other section or state, or on the average of the same region, or even in adjoining mines. The quality of the coal may affect this. For instance, I have in mind an operation in which at least 18 in. of the top coal is so poor that to mix it with the balance of the product would simply throw the coal from that mine off the market, yet right in the adjoining property the coal is taken on the first mining to the full height of seam.

Suppose that a body of coal was such that the market demanded it only during seasons of scarcity, at other times the mine running one-half or one-third of the time. This mine has a fireclay top, which disintegrates by contact with air, thus making it both dangerous and, likewise, expensive. Owing to the inferior conditions, the management placed here, both outside and inside, is not the highest-priced and consequently not the most efficient. The system of mining is that generally followed throughout this particular field. What per cent. of recovery could be considered the maximum? Is an operator required to conserve his commodity at prohibitive costs of production? Must he follow the general system of the region, even though his recovery is much lower than the general average, and his cost of production much higher?

Many mines have advanced a considerable distance in their development, but few are provided with sufficiently large barrier pillars along the main headings to give reserves for the final mining. The most of us know that the extraction of heading stumps on one side and a barrier pillar of 100 or 150 ft. on the other side is a slow process with small output, and I have wondered what effect the recovery of these barrier pillars will have on the ultimate recovery in a good many mines. Personally, I feel that the present high recoveries cannot be maintained to the end. Nature does not yield to us without effort on our part, and our exertions are on the increase while the capacities remain practically the same. There will be a period in the life of many mines when operations must move rapidly to keep down costs of production.

To tell what the maximum recovery should be under modern methods of mining appears premature, but certainly there are many factors to be considered when a question, such as that forming the subject of this paper arises.

✱

Explosion at Hillcrest, Canada

A disastrous explosion occurred in Mine No. 20 of the Hillcrest Collieries Co., Ltd., on June 19. Mine officials say that 236 men had entered the mine on the morning of the explosion, and of this number only 37 survive. The explosion was so severe that it shook the countryside for miles around, demolishing many small buildings. Rescue corps arrived at the mine soon after the accident and engaged in a desperate effort to clear the pit and reach some of the entombed miners at the foot of the shaft. Heavy falls of rock in the shaft rendered the work of the rescuers difficult.

Among the dead is Thomas Quigley, superintendent of the mine. Fire broke out soon after the explosion, rendering almost hopeless the work of rescue. The majority of the miners were foreigners, but a large number were English speaking. Cries for help issued from the shaft immediately after the explosion, but these soon ceased, indicating that the men had succumbed to the gases present in the workings.

The latest authentic report indicates that 191 men have been brought out of the mine dead. This leaves but 8 miners unaccounted for. It is possible that some of the remaining victims were buried beneath tons of rock and their bodies may not be recovered at all. The majority of the bodies recovered were burned beyond recognition. The coroner has adjourned the inquest until early in July. The generally accepted theory is that the disaster was due to an explosion of gas in the lower workings.

C. M. I. of A. Summer Meeting

SPECIAL CORRESPONDENCE

SYNOPSIS—The institute held a short meeting at Monongahela, of which perhaps the most interesting features were the address by the mayor, the paper of William Lauder, the address by A. P. Cameron and the question box.

✽

The summer meeting of the Coal Mining Institute commenced promptly at 10 a.m., June 16, in Eagle Hall, Monongahela, Penn., with Jesse K. Johnston, the president of the institute, in the chair. L. C. Isler, the mayor, made the address of welcome. His remarks were largely reminiscent of the early days of mining in the fourth pool of the Monongahela Valley. The mayor's experience was almost wholly from the workingman's point of view, for after a small explosion in the mine where he was propelling a ventilating machine, he left the mines never to return. Later he worked outside.

THE UNFORTUNATE PIONEERS OF THE FOURTH POOL

What seemed to have impressed him in those early times was the fact that, just as at present, hardly any of



WHERE THE INSTITUTE CONVENEED AT MONONGAHELA

the operators made any money, and the men were always pleased when a boat sank or a tippie burned down. The losses of the boss were the joys of his employees. Some of the mine owners, when the consolidation of the coal interests took place, saw a little real money for the first time. The exploitation of their properties profited them far more than operation, as has always been true of the coal business.

J. K. Johnston responded to the welcome, and Henry Louttitt and William Seddon spoke on the early history of the fourth pool and on the development of the Coal Mining Institute of America.

TIMBERING PAPERS AND DISCUSSIONS

In the afternoon William Lauder read a paper on "Method of Timbering and Quality of Timber." This paper, which was excellent, was unaccompanied by the necessary illustrations. This made it hard to follow, but it was otherwise a clear presentation of a somewhat well worn subject. William Seddon, of Brownsville, Penn., then read a paper on "Method of Timbering with

Reference to Overlying Strata and Geological Formation." This was followed by an address by H. I. Smith, assistant mining engineer, U. S. Bureau of Mines, on "Possible Substitutes for Mine Posts." In the discussion of this paper, W. R. Crane, dean of mining at State College, Henry Louttitt and R. D. Hall took part. The remarks, however, were rather supplementary than critical.

In the evening, H. I. Smith exhibited some slides showing mining conditions, and a discussion took place on the possibility of adding such agglutinants to hydraulic filling as would make it less susceptible to refushing by water should the breaking of the measures subject the flushed material to erosion; the purpose of such agglutinant material being not to give strength to the aggregate, but to prevent its being washed away when not protected by uncrushed supports. Mr. Smith said that sand under high pressure was rendered almost solid and could be pulled apart only with difficulty, but he was unable to give any information relative to the addition of agglutinating matter, such as iron-bearing clays, etc.

THE LAST WORD IN MINING MACHINERY

Later, S. A. Taylor gave his interesting lecture on the "Advancement of Bituminous Coal Mining during the Last Forty Years," with slide pictures on the screen. Mr. Taylor does not look with scepticism on the many attempts to make coal mining a really mechanical operation. He thinks we shall soon reach the period when coal will be not only undermined but displaced and loaded by machinery. The present tendency seems somewhat unfavorable toward face conveyors and favors cutting the coal and loading it directly into cars without the intervention of shovelers.

On the second day, A. P. Cameron, general superintendent, Westmoreland Coal Co., Irwin, Penn., delivered an interesting address on "Accidents Caused by Machine Mining as against Pick Mining." Reference is made to this in an editorial, and the importance of the matter cannot be over-rated, as legislation ruling that machines be excluded from pillar work nearly passed the State House and Senate.

One law has been prepared excluding electric currents from mines, and the legislators are largely pledged to exclude electric mining machines from pillars and from gaseous workings. The arguments put out by the friends of the latter bill allege that the explosion at the Cincinnati mine originated from a mining machine. Everyone knows, however, that the accident in that colliery has been ascribed by all authorities to an open light, and the statement to the contrary has evidently been coined to suit the argument of those who oppose the electric mining machine.

EMPLOYMENT OF FOREMEN BY STATE

Following Mr. Cameron's paper, W. E. Fohl conducted the question box. The first question was:

Would it be of advantage to the coal-mining industry to have the supervision of the operation of mines, as regards safety, in the hands of officials paid by the state, permitting the owners of the mines to place in control of operation, men who do not have state certificates of competency?

George E. Gay, mining engineer of Uniontown, gave a lengthy review of the subject, and from what we were able to discover, he felt that the certificate of competency was an important safeguard and needed by all the men in authority around mines, and was not demanded from the mine foreman solely because he had to enforce the law and take care of the safety of the miners. Consequently, even if the safety and economic duties of the mine foreman were separated and given to two different men, he did not believe it would be justifiable to permit either man to be uncertificated.

William L. Affelder, general manager of the Bessemer Coke Co., Pittsburgh, Penn., thought that the presence of an officer of the state in the mine at all times would probably cause continual friction. He regarded the question almost as a proposition to have the state operate the mines. On the other hand, R. D. Hall suggested that the proposal on the whole had its merits, as it released the foreman from the necessity of keeping the operator in obedience to the law in cases where the latter was not any too well disposed to follow its requirements.

FOREMAN WHILE PAID BY OPERATOR ENFORCES STATE LAW

The foreman was now both a servant of the state, enforcing the law, and an employee of the operator. He receives all his emoluments, looks for all his advances in position and derives all the honor he secures from the operator, while he is serving the state. He is thus serving two masters, and in a degree the operator might as well pay the legislators as pay the mine foreman, who is really a deputy of the state.

Any operator who had followed the requirements of a resident inspector would be excused in the eyes of the public for many of the accidents which in mines are unavoidable. The provision would also have the advantage that the state would regulate the number of foremen to meet the duties imposed by the law. Some foremen, under the present ruling, are required to do more than can be done in the time allowed and they seriously neglect their safety duties. Mines which obey the law find it difficult to meet their obligations to the state in face of the competition of their more negligent neighbors.

A. P. Cameron declared that the suggestion that the state pay the local inspectors or mine foremen, or whatever they should be called, made it unlikely that the proposal contained in the question would receive popular favor, seeing that the general tendency was to make every industry shoulder its own burdens.

COAL-LAND VALUES

The next question was:

What is a proper basis of coal-land valuation for purposes of taxation?

It was answered by Dr. W. R. Crane. His reply was at some length, full of valuable material, but withal so carefully guarded that it does not lend itself freely to condensation. W. L. Affelder stated that the real objection was to the method of assessment and not to valuation. If the assessors would only try to evaluate all the properties at their true value, all would be well. The millage would drop so that the burden on all would be equitable. But unfortunately the assessment is arbitrary and depends on the will of the assessor. S. B. Smith said that the duty of the assessor was clear, but he usually vio-

lated his sworn oath and did not attempt to ascertain what the property was worth. As every property was assessed below value, it was hard for anyone to make complaint, but the burden fell largely on those whose assessments, while too low, were not nearly so low as those of their neighbors.

THE DIME ROYALTY

R. Dawson Hall took exception to the evaluations based on a dime royalty, as if the value of a property could have any direct relation to a unit of coinage chosen at random. On it, however, had been based a most abstruse valuation scheme, with results which were evidently erroneous, as they did not result in large areas of coal land being sold, at least for purposes of coal mining. He thought the price of coal land in neighboring plots of land the best criterion wherever coal land was actually being sold, though in some places the dearth of lots for sale made such an estimate impossible. As a rule such estimates as were made were as clever and as useful as studies of a possible fourth dimension.

George E. Gay countered by quoting the biblical tithe, and W. E. Fohl even referred to Adam Smith, who said that one-tenth of the cost of the product was a fair, and one-fifth a high royalty. In America 10c. was fair for bituminous coal and 20c. was high, thus justifying Adam Smith. Anyone who would venture to confute such authorities as these two would be guilty of atheism and Anglophobia, so no one tried.

The next question was ill-conceived:

What precautions against individual accidents are most frequently overlooked in bituminous mining practice?

James B. Dunmire, of South Fork, Penn., replied by sending a list of nine important sources of accident. As might be expected, no one wished to give such an over-discussed subject further consideration, especially along enumeratory lines.

The last question came at the point of adjournment and therefore was not answered:

Would it be of advantage to have the drilling and shooting of coal performed by men in company employ? If this were done, what is the best form of drill? How many drillers would be required to each pair of shotfirers, and, approximately, how many tons of coal would be shot down in an 8-hr. shift in a 5-ft. vein by one drilling and shooting crew?

The attendance at the meeting was at all times disappointing. At no time were 50 present and at the opening meeting only 22. The mine inspectors' meeting the week before was partial cause for this small attendance and the selection of Monongahela as the convening point was also partly responsible. But it would be a folly to overlook the fact that institute activity as a whole has fallen on evil days.

✱

Woodward and Pettebone First-Aid Meet

The united first-aid corps of the Woodward and Pettebone collieries, will hold their annual meet on Saturday, Aug. 15, 1914, at Kingston, Penn. The prizes to be distributed are as follows: First adult team, \$50; second, \$25; third, \$15; and fourth, \$10. A safety lamp also goes to the captain of each winning team. The prizes for teams under 17 years of age are: First, \$15; second, \$10; third, \$5.

Who's Who in Coal Mining

William H. Taylor

Some of the most successful coal operations in this country are controlled and directed by men whose training has been along commercial rather than mining lines. In fact, the time has arrived when sound business judgment is as necessary to the success of a coal corporation as technical training and experience in engineering. One type of business man who has been successful in the mining fields is represented by William H. Taylor, president of the St. Clair Coal Co., Pottsville, Penn.

Mr. Taylor was born at Paterson, N. J. He spent his early boyhood in Paterson and Allentown, Penn., attending the public schools in both cities. He entered Dickinson Seminary, Carlisle, Penn., but left that institution at the age of 18 and entered upon his business career.



WILLIAM H. TAYLOR

He started as a clerk in his father's machinery-supply house, working his way up, so that upon the death of his father he was able to take charge of the business, which is now known as the Scranton Supply & Machinery Co.

Mr. Taylor is also president of the Franklin Coal Co., president of the Goodwin Car Co., of New York, director of the Coal & Iron National Bank, of New York, and a member of the Chamber of Commerce, of New York. He is a member of the Scranton Club and the National Geographical Society.

Mr. and Mrs. Taylor have four children—two daughters and two sons. Mrs. Taylor is a daughter of the late Samuel C. Barker.

Jesse S. Cheyney

The Stonegap Colliery Co., of Glamorgan, Va., has a live wire for vice-president and general superintendent in the person of J. S. Cheyney. Born at Rahway, N. J., in 1873, Mr. Cheyney received his early education in Pennsylvania schools, graduating from the "Friends' Boarding School," at Westtown, Penn., in 1889.

Two years after leaving school he identified himself with Williams, Brown & Earle, a Philadelphia concern dealing in engineering supplies. Then for five years he was employed in the Philadelphia offices of the Reading Coal & Iron Co. After this, he served three years on the engineering corps of the Lehigh Valley Coal Co., at Wilkes-Barre, Penn.

Leaving the anthracite field, Mr. Cheyney served for



JESSE S. CHEYNEY

nearly two years as engineer with the Fairmont Coal Co., at Enterprise, W. Va. His next job was division engineer for the Pennsylvania Coal & Coke Co., at Cresson, Penn., where he remained five years. Leaving the Pennsylvania company, he became superintendent of mines for the Straight Creek Coal & Coke Co., in Kentucky, and 18 months later he accepted a position as division superintendent for the New River Collieries Co., Eccles, W. Va. Since 1909 he has served in his present position.

The Stonegap company is owned by the Sheffield Coal & Iron Co., of New York and Alabama. The furnaces at Sheffield, Ala., receive their supply of coke from the Glamorgan ovens.

Editorials

Methane in Mine Air

Because the estimation of methane is a chemical operation, mine managers think it is necessary to have a chemist and a laboratory if they would analyze its presence in mine air. As a matter of fact, the work has been so simplified of late that no knowledge of chemistry is needed of the sampler or analyst. There is no reason why a mine foreman who has the simple apparatus outlined by G. A. Burrell, of the Bureau of Mines, and who has received an hour's instruction, should not be able to make a correct analysis with precision.

In fact, real chemists around industrial works are getting somewhat scarce. They are being driven out by the practical men who, working by rule-of-thumb methods, will make simple analyses without demanding a salary such as a chemist should receive. But this work of analyzing methane in mine air is even easier than sulphur determinations of coal, and any operator who will buy the apparatus and send an ordinarily bright man to the laboratory of the Bureau of Mines, can have such analyses made at a purely nominal cost.

It is probably true that large numbers of mines have in the return air a percentage of firedamp which would alarm the operator did he but know it. The extent to which the explosion spread in No. 5 Eccles suggests general methanization rather than the presence of an explosive mixture in one split only. The fact that analyses were never taken makes any such suggestion a mere assumption in which we may not be justified. Certain it is, however, that where the return air is likely to have a higher percentage of methane than is safe, the operator should ardently desire to know it and he is unduly negligent if he does not.

✽

Should Electricity Be Debarred from Mines?

There have always been people who feared the introduction of machinery and there will be such timid creatures till the end of time, and indeed there is something wholesome as well as unfortunate in that fear. We should always inquire carefully whether the introduction of advantages balances their dangers, but in sizing up the situation, we must be careful lest romancing creeps in to add imagination to risk.

The remarks of A. P. Cameron, at the Monongahela meeting of the Coal Mining Institute of America were quite relevant, in view of the great desire on the part of the less intelligent union men to shut out machinery from the mines. The miner wears machine-made clothes, lives in a house of machine-made lumber, uses a machine-made pick and carries a machine-made lamp and hardly touches anything from the cradle in which he reposes when he is born to the coffin in which he reclines in death but what is made by machinery and is cheapened by its use—yet he now tries to declare he will have none

of it. Others may labor for him with the utmost efficiency; he himself will work in the old-fashioned way. Cheap clothing, housing, picks, lamps, cradles and coffins for him, but dear coal for all others.

He has not been able to put this in the mining agreement, so he will see if he can insert it in the law, and so he has been inquiring in Pennsylvania of those candidates who are ignorant of mining whether they will help him drive the electric mining machine and even the electric current from the mines. And some have so pledged themselves, for the vote of the miner is the hope of the would-be representative.

Dangerous machinery is to be avoided, but we cannot admit that as a whole, electrical machinery, properly safeguarded, can be so classed. We don't believe Pennsylvania by any means a leader in proper precautions against trolley-wire accidents. We have seen more care in the West and there has been more agitation, at least, in Ohio, and probably the legislation in that state has had beneficial effect. Yet in the bituminous mines of Pennsylvania in 1912 only 5 men in 182,000 were killed by electricity on entries.

Nineteen machine runners and scrapers were killed in the bituminous mines of the state in 1912. Of these only one was removing pillars when killed, yet we are threatened with legislation prohibiting the removing of pillars by machinery. Of course, more machine coal is mined in rooms than in pillars, but nevertheless it remains significant that in 1912, only one man in the bituminous mines of the whole state of Pennsylvania, which produced over 30 per cent. of whole bituminous product of the United States in that year, was killed in the mining of ribs with a machine. On the other hand, 75 men were killed while removing pillars by hand and one man was killed at the deadly operation of going to work.

Four men were killed by the machines themselves. This was due either to carelessness or to inefficiently guarded machines and could well have been avoided. Two were killed by electricity at the face and one by electricity on the entry. Eleven were killed by falls at the face of the workings, showing that pillar drawing is possibly not as risky as work at the face. Until we know just how much coal is mined from pillars and how much from the solid face, the relative danger of face and pillar working will not be known.

At present, statistics as they stand show the face as 11 times more dangerous than the rib, but no one contends that such a calculation is fair, for it is obtained only by overlooking the greater amount of work done by machines at the face, and by disregarding the fact that more careful men usually work on the ribs, that bad ribs are usually withdrawn by hand and that the shortwall machine is largely used in such pillar recovery. However, with such a proportion against the agitators who would legislate to forbid the use of machines in rooms, it is a wonder that such propagandists do not withdraw their case with apologies to the public.

Thomas K. Adams' contention at the banquet of the Coal Mining Institute of America in 1912 was that the increased death rate in the last decade in the Pittsburgh district was due to the introduction of machinery, and this he considered proved by the fact that the mines in 17 counties around central Pennsylvania, which were somewhat backward in their machine development, did not show at the same time nearly such a fatality ratio. As a matter of fact, this was a conclusion which was not justified. Central Pennsylvania has a lower death rate than the Pittsburgh district, not because of her pick mining, but because the mine roof is not so dangerous. The mines in that section are safer now than before for the Kittanning coal with its unexcelled roof is replacing the Freeport coal with its pot holes, kettles, slips, general weakness and vegetal impurities. Besides both sections mine coal largely by machines, though statistics are not available to prove this fact.

The argument and question therefore simmers down to the following: One man was killed in the bituminous mines of Pennsylvania drawing ribs by machinery during 1912. Shall we or shall we not, because of this one fatality, make such rib drawing prohibitory?

The Cause of the Colorado Strike

Repeatedly we have been told that the strike in the southern districts of Colorado was a natural outcome of wrongs which could not be endured and even that war seemed less fearsome to these men than peace under such humiliating conditions.

But the origin of the trouble was not so simple. The strike arose from two causes—the pressure of rival states for the unionization of mines which were seizing their markets, and the need for action to galvanize a fast-dying local labor organization into life. At no time for years had the union been so weak in Colorado as before the strike, nor had it at any time been stronger elsewhere, and so far from the Colorado miners being goaded into rebellion, they had been rendered indifferent to the union and its aims by the considerate action of the operators. Welfare work had led the men to a realization that the companies were better friends of the miner than the labor organization, and the union was losing adherents year by year.

Something had to be done and done soon, or Colorado would soon be nonunion. The only way was to declare a strike at once, for otherwise the number of those who would stand by the union would soon be too small for them to make a successful appeal to those men who prefer peace, but who, being moral cowards, cannot refuse the call even to a quarrel in which they have no faith if an appeal is made to them by any large number of fellow-workers.

So the strike was called much as the Franco-Prussian War was declared. That war occurred only because the Emperor of the French, Napoleon III, knew that his dynasty was threatened by peace, and thought his authority would be strengthened by war. Napoleon and France were ultimately defeated, and so probably the union will be in Colorado. The relative strength of the forces was then and is now being miscalculated. The advocates of discord in Colorado, as in France, will find that unsuccessful war, such as they wage, is disrupting rather than

strengthening to their organization. However, we have always felt kindly toward France despite its aggression, nor in this struggle are we opposed to the union as a union, much as we must deplore its actions.

In fact, we doubt whether for many years it will be possible to say a good word for a union in Colorado, because of the large admixture of unnaturalized, unregenerate elements, it must necessarily contain. Even if we overlook the moral weaknesses of the Italian, Balkan and Greek peoples and of the Mexicans in Colorado, we cannot forget that the difficulties involved in instructing them in the proper action will always be insuperable so long as they do not acquire a knowledge of English. Ill-informed men are always irrational and employ unreasonable agents.

The Foreigner

The problem of immigration and its regulation should never be allowed to be forgotten. We are receiving for our "melting pot" such a mass of material that we sometimes wonder whether that vessel is refractory enough to do, without injury, the refining which is demanded of it. In fact, we believe that in places there are many signs of a loss of shape and color where the pot and its contents have slugged into an undesirable compound.

We are not strongly in favor of excluding the immigrant, because we believe that every man has an inherent right to seek work where it can best be obtained and to seek enlightenment and freedom wherever it may be found. This sentiment may appear academic rather than patriotic, but after all we have cast off local pride till our cities and states no longer have walls and tariffs to defend them and perhaps nations will soon be as open to the world at large.

What we do think we have a right to disapprove is the entrance into America of a large body of citizens who never learn the facts of our national life, and who never obtain the power to express themselves in our language.

No man should receive papers as a citizen till he can read, write and talk in English with fluency, far better than can, today, the average non-English foreigner, who has been here 20 years. No foreigner should be allowed to stay here more than 5 years unless he has, in no small measure, made progress in the use of our language, and every alien should be required to spend an hour every week day in attendance at an approved school. With due respect to our courts, we regard this as a more pertinent matter than an inquiry into the political faith of the applicant. We have as little right to demand that a man shall not be a socialist or individualist, as we have to require that he shall not be a Buddhist or a Mohammedan.

For the education suggested, these foreigners should themselves pay, and we are not prepared to think they would be unwilling. Where there are twenty or thirty foreigners in a village, the cost would not be prohibitive, and if any objected, their deportation would be a blessing to the country. We believe that if they were compelled to learn our language, they would be less likely to return to their native lands after we have spent weary years in their remaking.

The foreigner in this country should be able to read our newspapers and books, and to understand orders. He may vote and "raise Columbia" without these qualifications, but he will never make a citizen.

Discussion By Readers

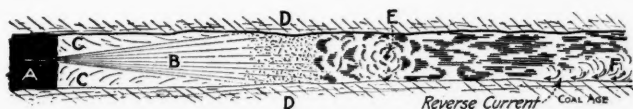
The Air Factor in Mine Explosions

I read with some interest James Ashworth's comments on Mr. Verner's theory relating to the cumulative effects of a coal-dust explosion, *COAL AGE*, May 2, p. 741; and Mr. Verner's reply to his queries, May 16, p. 818. I do not regard the conditions submitted by Mr. Ashworth as the basis of his interrogations, as in any way detracting from the plausibility of Mr. Verner's theory.

In regard to this theory, if I fully comprehend Mr. Verner's meaning, he advances the idea that the cumulative features of a coal-dust explosion or the ultimate range of its expansive effect is dependent on the presence of sufficient supplies of combustible material at the points where the highest temperatures prevail immediately after the explosive blast that is responsible for the ignition of the dust. I understand that Mr. Verner suggests that these supplies of combustible material are provided largely through the operation of what he has termed very properly "reverse air currents" induced by an alternate compression and expansion of the mine atmosphere.

In contemplating this condition in a mine entry, I have arrived at a fair conception of what might take place as the result of a blown-out shot discharging into the mine atmosphere, in the presence of accumulations of fine coal dust. The following graphic illustration may prove of interest and assist to a better understanding of the action of such reverse currents, setting back toward the center of the disturbance.

In the accompanying figure, the charge exploded is located at A. The divergent lines B are the projected lines



IDEAL SKETCH, ILLUSTRATING THE INITIATION OF A MINE EXPLOSION

of force resulting from the explosion of the charge. There is produced at once a zone of compression immediately in front of the discharge; and this compressive wave is driven forward at a high velocity, until its expansive force is exhausted or equalized by some opposing force. Where the diverging lines of force strike the sides, roof and floor of the entry, as at DD, the accumulated dust is thrown into the atmosphere. At this point, also, the diverging lines are deflected and become more or less parallel to the center line of the entry.

It is important to note, here, that there is a large space at the coal face, marked CC in the figure, which does not receive the direct force of the discharge of the exploding shot. The air in this space is naturally drawn into and swept away by the explosive blast, thereby producing more or less of a depression or vacuous condition behind the explosive wave. The reaction that is bound to take

place between the zone of compression in front and the zone of depression behind this wave forms an important feature and eventually gives rise to the "reverse current" described by Mr. Verner. I will refer to this again.

What we must consider now are the high temperature and velocity of the expanding gases thus projected into the entry. Under this high temperature, the fine coal dust distills much gas, which at once forms an explosive mixture with the air; and, as a result, there is developed an explosive center at some point marked E in the figure, which becomes the initial point of the mine explosion. More heat is developed, and the explosive effects become cumulative as the explosive wave extends more or less throughout the mine, depending on the supply of combustible matter and available oxygen to support the combustion.

I may now refer to the reaction that sets in at some point F, where the advance of the explosive wave from E becomes more or less exhausted or is equalized by the inflow of air from other parts of the mine. Owing to the difference of temperature between this air and the hot gases, the former flows in toward the center of the disturbance along the floor of the entry, while the expanding gases escape along the roof, as indicated in the figure. This reaction is assisted by the effect of the zone of depression that exists in the rear of the explosive wave and to which I have referred.

I believe the point to be emphasized is that this reverse current sets up a rotation of the air in the entry with the result that more dust is thrown into the atmosphere and burned. Other explosive centers, similar to that at E, are formed at different points, as the explosion proceeds throughout the mine. The effect is cumulative, depending on the conditions. An important point to note, in this connection, is that the explosive force at any center, while radiating in all directions from that center, is propagated to a greater distance outby, owing to the confined space inby from this point forming a *cul de sac*.

In my opinion, the reverse current traveling along the floor is determined, in position and intensity, by three factors: (1) the relative gravity of the air and expanding gases; (2) the formation of a zone of depression in the rear of the explosion; (3) the expansive effect and high pressure accompanying the advance of the explosive wave. It is worthy of note that the reverse current will necessarily contain both combustible material and available oxygen, which makes it the important air factor to which Mr. Verner has drawn attention. Such is what I conceive to be his theory, and its plausibility is based upon the fact that it is consistent with known laws.

In reference to Mr. Ashworth's statement that "the speed of the explosive wave (in the cases mentioned) must have been far too great to allow of the operation of a reverse impulse such as Mr. Verner suggests," I believe it is generally conceded that the rapidity of any reaction is in proportion to that of the force acting. I have heard it suggested that the jagged appearance of a

bolt of lightning may be ascribed to the alternate expansion and contraction incident to the electric discharge in the atmosphere. Most miners who have worked with safety lamps have observed the rapid expansion and contraction of the flame of the lamp when a near-by heavy shot was fired. Is it not possible that these observed effects are similar or at least analogous to what takes place in a mine explosion.

I would like to see Mr. Verner's theory fully tried out or tested by the experiments, which he has suggested should be made by the Federal Bureau of Mines. I would also like to see a further study and demonstration to prove or disprove Mr. Ashworth's theory of "detonation," in its relation to mine explosions. I feel convinced that these lines of study would prove valuable.

I. C. PARFITT.

Jerome, Penn.

The "Safety-First" Call

Letter No. 2—I have been much interested in the numerous references made to the "safety-first" idea, in COAL AGE and elsewhere. Some very good suggestions have been offered; but, judging from experience, I feel that we should try and educate all employees in the mine to coöperate with the mine officials in every effort to reduce the number of accidents occurring daily. The sooner we can induce mine employees to take an active part in striving to reduce the number of accidents, the sooner results will be obtained.

We have listened to valuable papers on this subject, at mining-institute meetings and smokers; we have read many articles on the same subject in the leading mining journals. We learn from these that the majority of mine accidents are due to the carelessness of the person himself or that of others.

Granting, as is commonly believed, that our mining laws are second to none, we are driven to the conclusion that these laws are not enforced as they should be. Greater discipline is required in the mine, and the coöperation of every mine worker, in this regard, is necessary in order to reduce the accident list.

Some employees regard it as an imposition by the mine officials when they are asked to take certain precautions to guard against possible danger. Some have even gone so far as to send the mine committee to the foreman to protest against the discipline of a man who has failed to comply with the mine regulations and thereby endangered the lives of his fellow workers.

On the other hand, some mine foremen seem to think that when they have told a man to take the necessary precautions for safety, they have done all that is required of them. They forget that the law commands the mine foreman to direct and see that its several provisions are strictly observed and carried out. Every mine foreman should realize that he is personally responsible for the enforcement of the law in its relation to the mine. The suggestion of patrolling the mine with safety bosses who shall have charge of 20 or 30 men is good; but to get results, discipline must prevail throughout the mine and all employees must coöperate with the officials in charge.

It is necessary that every man in the mine should feel his individual responsibility.

READER.

Punxsutawney, Penn.

Effect of Short-Circuiting Air on Speed of Fan

It is amusing to observe how many men, today, who are intelligent on most mining matters and hold certificates of competency to act as mine foremen, etc., have not seemingly observed or learned the fact that when the air current in a mine is short-circuited by opening the main or division doors at the bottom of the shaft, between the intake and return airways, the fan runs slower as a result. The greater number of these men, if asked this question, would answer unhesitatingly that the fan would increase its speed when the door was set open. It only goes to prove how we are all prone to jump at conclusions.

However, a wonderful advance is being made in this direction; and none appreciate it more than the readers of COAL AGE. In reading the article on this subject, in the issue of May 23, p. 862, and the answer there given, it occurred to me to ask, if there is not still another factor that enters into the case and causes the slowing down of the fan; or, in other words, makes the engine or motor, as the case may be, display that "tired feeling," notwithstanding the power remains constant.

Assuming the fan is exhausting the air from the mine, and the main doors are set open, so that the mine resistance is cut out, there is a rise of pressure in the fan drift and, as a result, the air enters the fan heavier, bulk for bulk, than when the doors are closed and the air circulates throughout the mine. This is in harmony with the law of the compression of air and gases, owing to an increase of pressure. It seems to me that the fan would naturally run slower when handling heavier air, at least when exhausting.

STRAWBROSS.

Farmington, Ill.

[While the reasoning suggested by correspondent, in reference to the slowing down of the fan when the air is short-circuited and the mine resistance is cut out, seems plausible, it must be remembered that the same conditions do not obtain in the blowing as in the exhausting system. In the exhaust system of ventilation, it cannot be denied that the air entering the fan is slightly heavier, bulk for bulk, when the air current is short-circuited. In the blowing system, however, the effect of cutting out the mine resistance is to relieve the pressure against which the fan is operating; and, as a result, there would be an expansion of the air, which effect would extend, to some extent, within the fan; and, by the same reasoning, the fan would then be operating upon lighter air and would thus be expected to run faster, if this reasoning were correct.

When it is remembered that the atmospheric pressure (14.7 lb. per sq.in. or 2116.8 lb. per sq.ft., sea level), is very great compared with the usual mine pressure of, say 5 or 10 lb. per sq.ft., and that the increase in density claimed when the fan is exhausting and the air is short-circuited would probably be less than one-half of one per cent., it is evident that this is an inappreciable factor, in the slowing down of the fan. The effective factor, as we previously stated, is found in the great increase in the frictional resistance within the fan, owing to the increased quantity and velocity of air passing. The effect is greatly magnified by the fact that the friction increases with the square of the velocity.—ED.]

The Mine Foreman

Referring to the recent interesting discussion of the many difficulties and discouragements that beset the work of the mine foreman, it occurs to me that these are, for the most part, the lot of every industrial worker. Many an ambitious mine foreman, perhaps possessing greater zeal than knowledge, has been permanently discouraged by the frigid reception accorded his proposed plan or scheme, by a thoughtless superior. To this foreman, the plan presented may appear as the pearl of his intellect; and he suggests its adoption with ardor and in the spirit of loyalty, believing that he has discovered what will revolutionize the work in his charge and double the production of coal or cut in half the cost of operation.

Much to the foreman's chagrin, this child of his brain is ruthlessly murdered by a few brutally frank words from his superior, accompanying the rejection of the plan. Is it any wonder that the foreman's interest wanes and that he sinks back to the level of a mediocre employee, instead of an ambitious striving foreman?

A word of encouragement or explanation, in the rejection of a plan, is seldom a bad investment of one's valuable time. To profitably handle the situation requires both tact and skill on the part of the superior. It is necessary for him to discern the foreman's particular view-

point; or to discover the angle at which he approached the proposition. In many cases, it will be found that, viewed at that angle, the plan was feasible, and this fact should be conceded; while, at the same time, he should be shown that from another angle, the proposed plan is impracticable.

By such a conference, the foreman's ambition is stimulated. He feels that he was not mistaken, but realizes that he failed to take a large enough view of the matter in question. The result is that his next suggestion will be more carefully considered and will probably contain real worth. By thus training the man to think there is developed a more expert and successful workman.

No one likes to be mistaken in his conclusions. On the other hand, when one is shown that there are conditions that he has not taken into account, his self-confidence is not weakened; and he applies himself with greater vigor to work out a better plan and reach the right solution. We all recognize the fact that, in any complex situation, it is not always possible to consider every condition affecting the solution of a problem. One of the most important elements, in the training of efficient foremen by their superior officers, is to endeavor to view the proposition from their standpoint.

ANONYMOUS.

Crumpler, W. Va.

Study Course in Coal Mining

By J. T. BEARD

The Coal Age Pocket Book

$$\begin{aligned} \text{Water gage, } w.g. &= \frac{p}{5.2} & w.g. &= \frac{12}{5.2} = 2.3 + \text{in.} \\ \text{Power on air, } u &= k s q^3 & u &= 0.00000002 \times 120,000 \times 500^3 \\ & & &= 300,000 \text{ ft.-lb. per min.} \\ u &= \frac{k s q^3}{a^3} & u &= \frac{0.00000002 \times 120,000 \times 25,000^3}{50^3} \\ & & &= 300,000 \text{ ft.-lb. per min.} \\ u &= q p & u &= 25,000 \times 12 = 300,000 \text{ ft.-lb. per min.} \\ u &= \left(\frac{q}{X_u}\right)^3 & u &= \left(\frac{25,000}{373.4}\right)^3 = 300,000 \text{ ft.-lb. per min.} \\ u &= p a^3 & u &= 12 \times 50 \times 500 \\ & & &= 300,000 \text{ ft.-lb. per min.} \end{aligned}$$

$$\text{Horsepower, } H = \frac{u}{33,000} \quad u = \frac{300,000}{33,000} = 9.09 \text{ hp.}$$

The square of the pressure potential can always be used instead of the cube of the power potential since these are equal, as expressed by the formula

$$X_p^2 = X_u^3$$

$$\text{Thus, } X_p = X_u \sqrt{X_u} = 373.45 \sqrt{373.45} = 7217, \text{ nearly}$$

Or the pressure potential can be calculated directly, by the following formulas:

$$\text{Pressure potential, } X_p = q \sqrt{\frac{q}{u}} \quad X_p = 25,000 \sqrt{\frac{25,000}{300,000}} = 7217, \text{ nearly}$$

$$X_p = \frac{q}{\sqrt{p}} \quad X_p = \frac{25,000}{\sqrt{12}} = 7217, \text{ nearly}$$

TANDEM CIRCULATIONS

To illustrate the formulas that apply to a tandem circulation where a single air current is carried continuously through shafts and airways of different size or cross-section, assume the following mine is passing 30,000 cu.ft. of air in a single undivided current:

1. Downcast shaft, 8 × 12 ft., 600 ft. deep
2. Main road, 6 × 10 ft., 1200 ft. long
3. Cross-tunnel, 6 × 8 ft., 200 ft. long
4. Upper seam, 5 × 14 ft., 2000 ft. long
5. Upcast shaft, 10 × 10 ft., 900 ft. deep

The sectional areas are 96, 60, 48, 70 and 100 sq.ft.; and the rubbing surfaces, 24,000, 76,800, 11,200, 152,000 and 90,000 sq.ft., respectively.

$$\begin{aligned} \text{Part potential values, } \frac{1}{X_u^3} &= \frac{s}{a^3} & \frac{1}{X_1^3} &= \frac{24,000}{96^3} = 0.0271 \\ & & \frac{1}{X_2^3} &= \frac{76,800}{60^3} = 0.3556 \\ & & \frac{1}{X_3^3} &= \frac{11,200}{48^3} = 0.1013 \end{aligned}$$

The Coal Age Pocket Book

$$\begin{aligned} \text{Part potential values, } \frac{1}{X_u^3} &= \frac{152,000}{70^3} = 0.4430 \\ \text{(Continued)} & \frac{1}{X_u^3} &= \frac{90,000}{100^3} &= 0.0900 \\ \text{Value for entire mine, } \Sigma \left(\frac{1}{X_u^3} \right) & & &= 1.0170 \\ \text{Mine part potentials, } X_{uo} &= \frac{1}{\sqrt[3]{\Sigma (1/X_u^3)}} = \frac{1}{\sqrt[3]{1.0170}} = 0.9944 \\ X_{po} &= \frac{1}{\sqrt{\Sigma (1/X_p^2)}} = \frac{1}{\sqrt{1.0170}} = 0.9916 \\ \text{Pressure, } p &= \frac{k Q^2}{X_{uo}^3} = \frac{0.00000002 \times 30,000^2}{0.9944^3} = 18.3 \text{ lb. per sq. ft.} \\ \text{Water gage, } w.g. &= p/5.2 = 18.3 \div 5.2 = 3.5 \text{ in.} \\ \text{Power on the air, } U &= \frac{k Q^3}{X_{uo}^3} = \frac{0.00000002 \times 30,000^3}{0.9944^3} = 549,000 \text{ ft.-lb. per min.} \\ \text{Horsepower, } H &= \frac{U}{33,000} = \frac{549,000}{33,000} = 16.6 \text{ hp.} \end{aligned}$$

SPLIT CIRCULATIONS

(Natural Division)

Equal Splits.—When an air current divides naturally between two or more equal splits, the calculation of the mine potentials, velocity, pressure, power, etc., is the same as for a single undivided current, except that the sectional area (a) of the airways must be multiplied by the number of splits (n) to obtain the total area of passage (na).

To illustrate the application of the formulas in this case, assume an air current of 60,000 cu.ft. of air is circulated in three equal splits, the size and total length of the airways, including the returns, being 5x8 ft. and 10,000 ft. long.

$$\begin{aligned} \text{Velocity, } v &= \frac{Q}{na} = \frac{60,000}{3(5 \times 8)} = 500 \text{ ft. per min.} \\ \text{Mine part potentials, } X_u &= \frac{na}{\sqrt[3]{s}} = \frac{3(5 \times 8)}{\sqrt[3]{260,000}} = 1.880 \\ X_p &= na \sqrt{\frac{na}{s}} = 120 \sqrt{\frac{120}{260,000}} = 2.578 \\ \text{Pressure, } p &= \frac{k Q^2}{X_p^3} = \frac{0.00000002 \times 60,000^2}{2.578^3} = 10.83 \text{ lb. per sq. ft.} \\ \text{Water gage, } w.g. &= p/5.2 = 10.83 \div 5.2 = 2.08 \text{ in.} \\ \text{Power on the air, } U &= \frac{k Q^3}{X_u^3} = \frac{0.00000002 \times 60,000^3}{1.88^3} = 650,000 \text{ ft.-lb. per min.} \\ \text{Horsepower, } H &= \frac{U}{33,000} = \frac{650,000}{33,000} = 19.7 \text{ hp.} \end{aligned}$$

Inquiries of General Interest

Problems in Rescue Apparatus

For some time past, I have been studying several problems that have presented themselves during a course of training with rescue apparatus. While some of these have been solved by a longer and more intimate acquaintance with the apparatus and a better knowledge of the subject, there are some that still remain unexplained. I believe that many members of rescue corps have been or are confronted with the same problems, and, for the benefit of such as well as myself, I desire to present the following question for solution. I know of no better medium for doing this than the columns of COAL AGE.

In the description of many types of breathing apparatus used in mine-rescue work, it is stated that 2 liters of oxygen per min., or 120 liters per hour, are supplied to the wearer, by the oxygen cylinder of the apparatus. It is further stated that the capacity of the machine to absorb carbon dioxide (CO₂) is 50 liters per hr.

Now, the reaction that takes place in the formation of carbon dioxide by the combustion of carbon in oxygen is represented by the following simple equation. It is not necessary, in this case, to consider the nitrogen of the air, for the reason that little if any nitrogen enters the lungs while the breathing apparatus is being worn, assuming the oxygen contained in the cylinder is pure and there are no air leaks in the apparatus; although some assert that there is generally a small percentage of nitrogen mixed with the oxygen in the tanks supplied by many manufacturers of this gas. The reaction in oxygen is as follows:



This equation shows that for every volume of oxygen consumed there is a corresponding volume of carbon dioxide produced. If, as stated above, the capacity of the apparatus is sufficient to absorb only 50 liters of carbon dioxide per hour, and this represents a consumption of an equal volume (50 liters) of oxygen, there are still 120 — 50 = 70 liters of oxygen unaccounted for.

It is true that moisture or water (H₂O) is absorbed by the caustic potash, supplied with each apparatus for this purpose. But, I would like to ask, is it possible that the water formed in breathing absorbs so large a portion of the oxygen? In other words, is it possible that 70 liters of the oxygen go to form water, while only 50 liters per hr. are concerned in the combustion of carbon, to form carbon dioxide?

I understand that whenever the excess valve is working on the apparatus, both oxygen and nitrogen are given off at the valve; and, as the source of nitrogen, in the working of the apparatus, is extremely limited, the use of the excess valve can hardly be supposed to be necessary to eliminate this nitrogen from the apparatus. Is it a fact, then, that there is a loss of oxygen through the excess valve; or is practically all of the oxygen supplied by the oxygen cylinder consumed in the reactions due to breathing? What proportion of the oxygen in the oxygen cylinder goes to form carbon dioxide and how much of it is

consumed in forming the moisture produced in breathing; and are there other compounds formed?

I would like to see an answer to these questions in COAL AGE. Perhaps some of our readers with a knowledge of physiology can explain this matter, by stating exactly what takes place. The subject of mine-rescue apparatus is too serious a one to be left wholly to the manufacturers of any particular type of apparatus.

W. H. MOORE.

Nanaimo, B. C., Canada.

It is well nigh impossible to state exactly the reactions that take place between the hydrocarbons, in the building up of the tissues of the body through the supply of oxygen to the lungs. Correspondent is quite right in the suggestion he makes that other compounds take part in the reaction.

It is well to note that in the formation of water vapor (H₂O), each volume of oxygen consumed takes up twice its volume of hydrogen, and there are formed two volumes of water vapor. Assuming, then, that of the 120 liters of oxygen per hr. supplied by the apparatus, 50 liters go to form the 50 liters of carbon dioxide that are absorbed by the caustic potash per hr., the remaining 70 liters of oxygen per hr. must combine with the hydrogen of the hydrocarbons of the body. These hydrocarbons are numerous and their constitution is often very complex. The fatty substances of the body are ethereal salts formed by the action of acids upon an alcohol (glycerin). The principal acids taking part in this reaction are three in number: Palmitic, stearic and oleic acid. Their formulas are very complex, as will be seen from the following:

Glycerin, C₃H₈O₂
 Palmitic acid, C₁₆H₃₂O₂
 Stearic acid, C₁₈H₃₆O₂
 Oleic acid, C₁₈H₃₄O₂

It is evident, from the complexity of these formulas, that it would be practically impossible to forecast the reactions that take place and which result in the formation of carbon dioxide and water vapor. It is evident that a large amount of oxygen is derived from the hydrocarbon acids; and, in the breaking down of these complex molecules, much of the water vapor is formed directly from the hydrogen and oxygen in the molecule.

We are glad to have these questions brought up by correspondents, as they not only show that the subject is being carefully studied by those who are training for rescue work, but the questions stimulate further study on the part of those whose duty it is to investigate closely all the conditions surrounding the use of the apparatus and the reactions taking place therein. By this means only, is it possible to arrive at an intelligent solution of the problems presented, and to obtain the highest efficiency and safety in the use of the means employed. We shall be glad to have our readers take up this matter further, telling of the difficulties they have experienced in the use of breathing apparatus and the means and methods they have adopted to avoid them.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—Where a seam cuts a fault, the vertical rise is found to be 60 ft.; and the seam beyond the fault is discovered to have a dip of 4 in. to the yard. It is desired to calculate the length of a drift rising $1\frac{1}{2}$ in. to the yard that will cut the seam beyond the fault.

Ans.—Since the seam dips 4 in. per yd., and the drift rises $1\frac{1}{2}$ in. per yd., beyond the fault, the two will approach each other at the rate of $4 + 1.5 = 5.5$ in. per yd. The total vertical rise at the fault being $60 \times 12 = 720$ in., the length of the drift from the fault to its intersection with the seam is $3(720 \div 5.5) = 392.7$ ft.

Ques.—The estimated volume of gas filling the head of an entry is 25,073 cu.ft. It is desired to know how this volume of gas will be affected when the barometer falls from 30.7 to 29.9 in.

Ans.—Assuming that the temperature remains constant, the volume of air or gas expands in proportion to the fall of pressure. In other words, the volume ratio is equal to the inverse-pressure ratio or the inverse-barometer ratio. Therefore, calling the expanded volume of the gas, due to the fall of the barometer, x ,

$$\frac{x}{25,073} = \frac{30.7}{29.9}$$

$$x = \frac{30.7}{29.9} \times 25,073 = 25,743 \text{ cu.ft.}$$

The quantity of gas given off or expanded on the entry, in this case, is $25,743 - 25,073 = 670$ cu.ft.

Ques.—A careful test made in the upcast shaft shows the air current to be a 2.5 per cent. mixture of air and marsh gas (CH_4); if the quantity of air passing into the mine is 50,000 cu.ft. per min., how many cubic feet of marsh gas does the upcast current contain?

Ans.—If the volume of gas in the upcast current is 2.5 per cent., the percentage of air in the current is $100 - 2.5 = 97.5$ per cent. Therefore, if 50,000 cu.ft. is 97.5 per cent., the total volume of the return current (air and gas) is $50,000 \div 0.975 = 51,282\frac{1}{3}$ cu.ft., and the volume of gas present is, then, $51,282\frac{1}{3} - 50,000 = 1,282\frac{1}{3}$ cu.ft. per min.

Ques.—If 20,000 cu.ft. of air is passing through a mine per minute, what amount of marsh gas (CH_4) must be taken up by the air current, in order to produce a 3-per-cent. mixture in the return airway?

Ans.—The air in the return current, in this case, forms $100 - 3 = 97$ per cent. of the mixture. Therefore, if 20,000 cu.ft. is 97 per cent., the entire volume of the mixture is $20,000 \div 0.97 = 20,618\frac{1}{2}$ cu.ft. per min. The volume of gas absorbed by the air current is, then, $20,618\frac{1}{2} - 20,000 = 618\frac{1}{2}$ cu.ft. per min.

Ques.—State how you would develop, arrange, equip, officer and manage a gaseous and dusty mine, to insure freedom from accumulations of gas and dust and the dangers incident thereto, keeping in view safety and economy.

Ans.—The development, arrangement and equipment of any mine must depend on a large number of conditions, which it is impracticable to assume. In a gaseous and dusty mine, the mine foreman must employ a sufficient number of competent assistants to enable the thorough inspection of every working place at frequent intervals throughout each working day. The men making this inspection must be competent to give the necessary instructions to the miners and to supervise their work in such a manner as to avoid the occurrence of accidents due to unsafe conditions existing in the mine, with respect to timbering, mining, blasting and loading coal, and the proper ventilation of the entire working face. To insure the thorough inspection of each place and to reduce the number of accidents, each assistant to the mine foreman should have charge of only such extent of territory as will enable him to thoroughly supervise every detail of the work and to see that the mining law and the mine regulations are strictly carried out. The largest economy is insured by the greatest safety in mine operations. All fine coal and slack produced in mining must be loaded out and dust-tight cars must be used.

Ques.—What conditions are required for the successful operation of a siphon?

Ans.—1. All joints in the pipe line must be air-tight. 2. The suction end of the pipe must be sufficiently submerged in the basin to prevent the entry of air into the pipe. In most cases, it is necessary, also, for the discharge end of the pipe to be submerged, although when the pipe is running full, this is not essential. 3. The vertical lift on the suction end of the siphon should not much exceed 75 or 80 per cent. of the height of water column the atmosphere will support. 4. Where the fall of the discharge end of the siphon exceeds the height of water column supported by atmospheric pressure, it is necessary to so proportion the diameters of the discharge and suction ends, that the flow of water from the summit to the discharge under gravity, will not exceed the flow from the supply basin to the summit under atmospheric pressure. When these conditions are fulfilled, it is unnecessary to throttle the discharge of the siphon to prevent the pipe from emptying itself. 5. There is frequently a tendency of the air contained in the water to accumulate at the summit of the pipe, especially if the pipe is not running full. It is then necessary to arrange an air-trap at the summit to draw off this air as it accumulates.

Ques.—How much greater load will a crossbar 8 in. wide and 12 in. in depth, 8 ft. long, sustain than one of the same width and length but 10 in. in depth?

Ans.—For rectangular beams, the maximum possible load varies as the square of the depth of the beam; in other words, the ratio of the load supported varies as the square of the depth ratio. Therefore, for the same width of beam and length of span, a beam 10 in. in depth will support $(\frac{10}{8})^2 = (\frac{5}{4})^2 = \frac{25}{16} = 1\frac{9}{16}$ times the load that a beam 8 in. in depth will support.

Coal and Coke News

Washington, D. C.

Independent coal mine operators in Colorado have made it known that they would issue from time to time statements concerning the situation in the coal mining section of that state in order that there may be no misunderstanding on the part of the public, and no tendency to regard the issue as confined entirely to the Colorado Fuel & Iron Co. In their first official statement the independent operators including about a dozen in all, take sharp issue with the statements that have been disseminated by the United Mine Workers and assert that the only issue at stake is the question of law and order and the right of individuals to work as they find opportunity therefor. In summarizing their position the independent mine owners say:

There are today employed by the owners of coal mines in this state more than 10,000 men. They and their wives and children live in villages many of which have sustained the rifle fire of about 1500 members of the United Mine Workers of America.

We cannot remove our mines to other places, and we will not, unless forced to do so, close them at the behest of a comparatively few members of a lawless organization and set adrift the loyal employees now upon our payrolls.

If the 2000 members of the organization now militant in this state do not care to work in our mines, it is their privilege to decline to do so and go elsewhere into fields where there are conditions more to their liking; and the officers of the organization to which they belong will once and for all settle the unrest which prevails here if they will expend some small portion of their funds to remove their dissatisfied members from this field instead of further increasing their lavish expenditure in the promotion of strife and bloodshed.

The issue in Colorado has ceased to be, if it ever was, one between capital and labor. In our judgment no question of the rights of organized labor is now involved.

By the use of the vicious checkoff system, the leaders of the United Mine Workers of America have coerced thousands of industrious and law-abiding citizens into joining their organization, and these leaders, by precept and example, have converted these men into enemies of organized government.

This organization, by force of numbers, by its control of labor, and by virtue of the millions of dollars forcibly collected from its members, has become so powerful that its leaders are now defying organized society to thwart its plan, to rule or ruin.

By their criminal acts the leaders of the United Mine Workers of America have forfeited any claim that organization may ever have had to be considered a labor union, and have foreclosed any right it may ever have possessed as a pretended labor union, to demand that we have business dealings with it.

There has been great misunderstanding in Congress with reference to the actual position assumed by the operators as well as with reference to the Colorado situation in general, and it is believed that the statements which the operators are planning to issue will prove of considerable service in clarifying the minds of many legislators.

Oil Land Controversy Settled

The long contested issue between the transcontinental railroads and the government with reference to oil lands was settled by the Supreme Court in a decision handed down on June 22 in which the view was taken that patents held by the transcontinental railroads could not be set aside by other claimants merely because of their mineral value but could only be altered through a direct attack by the government if at all while the view was taken that the limitation of the time at which the government could take exception to the patent was in the 1900 or 1901.

In handing down a decision in the case, Justice Vandervanter expressed the opinion that in all previous cases of the same kind the Court had held that where law requires that only mineral or homestead lands are to be granted by the land officials such officials must do their full duty by ascertaining whether the land granted came within the law at the time and could not do it by inserting the provision that if the land should later prove not to be within the law the title should not be transferred.

This was practically the attitude taken by the attorneys for the roads, they having urged that it was too late now to introduce testimony as to the character of the lands when as a matter of fact that character was passed upon at the time when the grants were actually made.

The decision is expected to dispose of the controversy with reference to the large volume of oil lands said to be worth \$700,000,000 which have been held by the roads but whose title has been contested by various persons on the ground

that the finding of oil made the lands mineral in their nature, and hence not properly patented at the time the railroads took title to them. The roads have claimed that the oil deposits did not constitute the lands "mineral" lands and further alleged that in any event the title that they had acquired could not be attacked. In a statement immediately given out on behalf of the Southern Pacific Ry. as soon as the decision was rendered the following assertions were made:

The suit decided by the Supreme Court, today, involved the validity of patents issued to the Southern Pacific under a certain land grant or grants from the United States Government. It was claimed that the discovery of oil on the lands covered by the patents voided such patents and put an end to the Southern Pacific's title to the lands. The main grounds for this contention were:

1. That oil was a mineral;
2. That the patents contained a reservation that they should not cover mineral lands;

3. That by accepting patents with such mineral reservation clause therein the Southern Pacific was stopped from questioning the validity or effect of such reservation.

The Supreme Court has decided that the mineral reservations of our patents are void; that the Secretary of the Interior had no right to insert the same; and that the railroad company was not responsible for the presence of such reservations in the patents, and was, therefore, not bound by them. The Court further declared that it was the duty of the Secretary of the Interior to investigate and come to a conclusion as to whether the lands to which patents were applied for were mineral, and that, having reached a conclusion, it was the duty of the Government to issue a patent or to refuse to issue a patent.

Having issued the patent in question, the Court held that, in the absence of fraud, the patents did not become void by reason of the subsequent discovery of minerals on the lands.

HARRISBURG, PENN.

A decision of far-reaching importance in the anthracite coal regions was made by Judge P. A. O'Boyle of Luzerne County, on June 18, when he announced that he would grant the preliminary injunction asked for by the residents of Plymouth against the Plymouth Coal Co. to restrain that corporation from continuing operations under the streets of the town. The question of granting this injunction has been up before the court for over three weeks and there have been arguments on the matter continually for this time.

The decision of the Court is along the lines of the provisions contained in the Davis mine cave bill passed by the last legislature which made it unlawful for any coal corporation to remove the support of a public thoroughfare. Actions similar to the one that has been heard during the past several weeks have been started by property owners in Lackawanna and other counties in the hard-coal regions.

The preliminary injunction will become effective as soon as the borough has filed a bond in the sum of \$10,000. The injunction will be argued before the court sitting en banc on June 29. The bond to be furnished by the borough of Plymouth is to protect the coal company from damages. An area of virgin coal in the Lance vein is practically the only portion of the mine in which operations will be possible in the event that the final decree is granted.

This question is one of great importance to every anthracite community. If the coal company can be prohibited from mining under the highways and public buildings because of the danger of surface settling, a great deal of adjoining property will also be protected because of the danger of lateral sliding from under the streets and public buildings.

If the rights of the mining companies are paramount to the welfare of the public, because of the money they have paid for the coal and the contracts they have entered into then the public can have no relief. If the safety of the thoroughfare and the public buildings and the pipes of public service corporations can be secured notwithstanding the losses which the coal companies would incur by a suspension of operations, then the public interests can be safeguarded in part at least. The final decision will have a most important bearing upon the whole mine-cave problem.

PENNSYLVANIA

Anthracite

Wilkes-Barre—Five hundred employees at the Maxwell colliery of the Lehigh & Wilkes-Barre Coal Co. went on strike recently, because a driver boy was discharged for killing a mine mule. The company officials claim the boy was negligent.

Deductions granted the Pennsylvania, Delaware & Hudson and the Hillside Coal & Iron companies for coal mined during the year, 1913, have made a total decrease in the county valuation for 1914 of over one million dollars. Next year all municipalities underlain with coal will suffer great reductions as many large companies will be allowed for the coal mined during two years. While the values of surface property and buildings are constantly increasing, that of coal will decrease from year to year. This will soon be keenly felt in many municipalities.

The Board of Examiners for mine inspectors in Luzerne and Carbon Counties have announced that they will hold examinations for certificates as mine inspectors in the high-school building at Wilkes-Barre on July 6, 7 and 8, 1914.

There has been some question as to whether or not an examination would be held this year. Chief James E. Roderick, of the State Department of Mines, is of the opinion that no examination is necessary on account of the fact that there is no vacancy occurring this year in the office of inspector in the counties named. The court and the examiners, however, believe that an examination should be held in order to qualify candidates for any vacancy that may happen, and it has been decided to hold an examination at the time and place stated above.

Port Griffith—Walking into a pocket of gas with a naked lamp in the old workings of the Red Ash vein of the Hoyt shaft, Pennsylvania Coal Co., George Bradley, fireboss, and William Jefferey, mine foreman, were seriously burned on June 19. The accident happened as the two men were descending a pitch about 1000 ft. from the foot of the shaft. Bradley was walking ahead and caught the force of the explosion of the unexpected pocket of gas.

Scranton—With the leasing from the Scranton Coal Co. by the East Mountain Coal Co. of a tract of land on the East Mountain near No. 5, where the old Quinn breaker was located, plans for the erection of a modern breaker which will give employment to between 75 and 100 men are now complete.

The officers of the East Mountain Coal Co. are J. W. Sandercock, of Lake Ariel; W. Y. Moffatt, of Dunmore, and Alfred Harven, of Scranton.

Archbald—The Archbald Coal Co., on June 16, posted signs at the pay office stating that any man who did not report for work the next day would be discharged instantly. Every man was back on the job. As a result of the order hundreds of dollars have been kept from the saloons, it is said. For years it has been customary for miners and others employed around the collieries who drank intoxicants to take a day or two off to "sober up" after pay day. There will be no more "sobering" sessions at this colliery, they say.

Mt. Carmel—The Susquehanna Coal Co. following an inquiry into several accidents at the mines between here and Shamokin, discharged six employees on June 18, who were held responsible. It was said they were under the influence of liquor. Notice was served that hereafter all men found intoxicated in and around the workings would be discharged.

Mahanoy City—Joseph Witamanski, John Montsavage and Jenkin Jarlavis, of this place, on June 16, pleaded guilty to perjury in efforts to fraudulently obtain miners' certificates and were sent to jail for nine months.

Bituminous

Johnstown—Two men were killed and eight injured as the result of a cave-in in the Quemahoning mine on June 20. All of the injured were Hungarians. The Quemahoning Coal Co. mined a special grade of bituminous coal used largely in the United States Navy.

Kittanning—The location of at least one of the several new mines, which the Shawmut R.R. will open between Kittanning and Freeport has been selected. This will be at Logansport where several openings will be made. Other openings have been decided upon, but the exact place where these will be made has not been fixed. It is said that the new Shawmut extension will be completed to Freeport, and coal will be shipped from several of the proposed new mines by the time snow flies.

WEST VIRGINIA

Charleston—The recommendations of the Conciliation Board appointed by the Secretary of Labor of the United States were accepted and approved at a meeting of operators on June 20. It is assumed that, under the terms of the recommendations, the miners will resume work at once while the terms of settlement have been submitted to a referendum vote to be taken not later than June 25.

The Hickory Ash Coal Co., employing 200 men on Coal

River and the Standard Kanawha Coal Co., on Elk River, both independent of the operators' association, have signed contracts with the miners' organization granting the check-off.

The West Virginia Federation of Labor has asked by a resolution adopted unanimously that Governor H. D. Hatfield appoint a commission to revise the mining laws of West Virginia and to report a bill for enactment by the General Assembly.

Fayetteville—The annual report of the New River Co., which has just been made to the stockholders, shows a deficit of \$57,421 for the operations ending March 31. The deficit for the preceding year was \$211,914. Labor troubles and uncertainty of market conditions prevented the company from earning a profit on the year's business.

ALABAMA

Birmingham—Coal operators and officials of railroads operating into Birmingham will hold a conference within the next few weeks to discuss the question of freight rates. This question has been up for consideration several times, but no satisfactory settlement has ever been made. The matter will be fully discussed at the meeting, and it is expected that some agreement will be reached.

Bessemer—News from the coal mining districts shows more activity than for some months. The mines of the Woodward Iron Co., at Dolomite, are reported to be working five days per week, getting out coal for the new furnace that is expected to be blown in shortly. Reports from Blue Creek also, and further down the Mineral R.R. show mines active, working good forces and getting out more coal than for some time. Optimism prevails among coal men so far as the last half of the year is concerned.

KENTUCKY

Hemphill—The first train over the Yount's Fork branch of the Louisville & Nashville R.R. was run last week, from Neon into Hemphill, a new city in the Letcher County coal field of the Elkhorn Mining Corporation. The Potter's fork branch of the railroad, which will run into Haymond, another new city of the same mining company, is practically completed and trains will start running over it very shortly.

Louisville—Business conditions are expected to respond in a measure in Kentucky to the settlement of the differences between the state authorities and the foreign fire-insurance companies, which withdrew from the state after the passage of the Green-Glenn law by the last legislature. Negotiations had been deadlocked for some months until the business interests of the state led by the Manufacturers' & Shippers' Association, took a hand in working for a settlement. The Green-Glenn bill will not be enforced and concessions were made by both sides, while a committee will attempt between now and the sitting of the next legislature to frame an adequate insurance law which will be acceptable to all interests.

OHIO

Martins Ferry—The third fire to occur at the Barton Coal Co.'s mine in two months destroyed the fan house on June 18. The origin of the fire is unknown, but it is believed that an electric spark may have started it. Work of reconstruction was immediately started, so that the mine could be kept ventilated and ready for use in case a wage scale agreement is signed. It is expected that a new fan will be installed.

Columbus—Nothing of consequence was accomplished at the three days' conference of operators and miners in Columbus last week. Both sides appeared firm in their original demands, and as a consequence, no disposition to compromise was shown. After the vain wrangling of three days the conference adjourned Friday, June 19, to meet again Tuesday, June 23.

Wadsworth—The James Coal Co., which was recently organized has started to open a mine on the Harpley farm, located near Wadsworth in Medina County. The leases on the land has been held for six years by George C. White and Perry Winkleman.

INDIANA

Terre Haute—A strike of the 2500 miners employed in the strip pits in this vicinity was called by the United Mine Workers to take effect Saturday evening, June 20. This is the result of the break in negotiation for a new scale which recently took place at the joint meeting of the miners and operators.

When the Sugar Valley Coal Co. refused to reinstate B. J. Hixson, an engineer at the National mine, 100 miners quit work.

Linton—The Froschner Coal Co. has opened a stripping plant at Vicksburg in this field.

ILLINOIS

Herrin—One of the largest coal sales in mining properties recorded in recent years is that of the purchase by the Taylor Coal Co., of this place of the properties of the Southern Illinois Coal & Coke Co. The properties consist of three mines: Possum Ridge on the Williamson-Franklin County line, Oak Ridge, between Herrin and Johnston City, and Hemlock mine south of Herrin, approximating 2000 acres of coal rights. The Southern Illinois Coal & Coke Co. has had a somewhat checkered career, it being organized several years ago by T. R. Trundle, who succeeded in interesting Eastern capital. There have been many changes since that time in the management, but in the past few years Wm. M. Wood and W. J. Jepson, of Boston, have been active in its control. During the past winter squeezes at the Oak Ridge mine put it out of commission, and then the general depression of the coal trade brought about a feeling on the part of Eastern capitalists to dispose of the property. This will make five mines controlled by the Taylor Coal Co., all in and around Herrin.

Seatonville—It is stated that the Seatonville mine which has lain idle for ten months is soon to be reopened and operations commenced upon a considerable scale. Much cleaning up and preparation will be necessary, as a considerable amount of rock has fallen in, and the roadways have gotten into bad shape.

MISSOURI

Kansas City—Little headway had been made by the scale committees of the Southwestern Interstate Coal Operators' Association and Districts Nos. 14, 21 and 25 of the United Mine Workers of America, up to June 20. The stumbling block to negotiations was Section 1, covering arbitration. Each side eventually appointed a subcommittee of three men to reach an agreement on this question.

Appleton City—W. H. Fox and associates, who recently began an operation on the Charles Hunt farm near Appleton City, have begun selling coal in that section. About 25 tons is being mined daily. This output is being absorbed by threshermen.

Columbia—W. P. Moore and James Hudson have purchased the Ballenger farm for \$9500, and will sink an operation.

KANSAS

Pittsburg—Eight hundred miners who had been on strike at the mines of the Crowe Coal Co., returned to work recently, a satisfactory settlement of the differences between the miners and operators having been reached.

Leavenworth—Neyle Fish, one of the receivers for the Home mine, recently destroyed by fire, announced that Eastern capitalists who recently inspected the mine were favorably impressed and probably will rebuild the plant at a cost of \$100,000. Concrete buildings and electrical equipment throughout is proposed.

Columbus—A vein of coal was discovered on the George Hood farm near Columbus on June 17. Drilling will continue to determine the extent of the field.

ARKANSAS

Fort Smith—Peter Stewart, of McAlester, Okla., president of that district of the U. M. W. of A., with five others, has been cited to appear in the United States Court July 1 to show cause why he should not be prosecuted for contempt of court. The citation grows out of an alleged violation of an injunction granted the Mammoth Vein Coal Co. for its mine at Prairie Creek as a result of the recent strike there. The defendants are charged with attacking and intimidating non-union miners.

OKLAHOMA

Gowen—The Kala-Inla mine at Gowen, Okla., has been sold by the Bache-Denman Coal Co. to A. G. Lunt, of New York, who is said to represent Eastern financiers. This operation was opened 10 years ago and has a capacity of 600 tons. It is electrically operated, and was the only mine owned by the Bache-Denman company in the Oklahoma district.

WYOMING

Centennial—Alleging fraud in obtaining title, the government recently instituted suit against the Northern Colorado Coal Co. for the possession of coal lands in North Park valued at \$1,500,000. Illegality and the use of dummy entrymen will be charged by the government. Seven hundred acres of the company's holdings are not affected by this litigation.

Cumberland—The boiler house at Cumberland No. 1 was recently burned together with all the machinery contained therein. It is believed that this fire originated through spontaneous combustion, and although the fire department did good work, it had all it could do to save the tippie and engine house which were close by.

FOREIGN NEWS

Berlin, Germany—It is alleged that the coal syndicate, with the government as one of the partners, has not yet been renewed, and may not be. Its members include also iron and steel firms, and it is in the finished steel industry that dissension has appeared.

Swansea, Wales—After a night of panic above ground during which men and women prayed fervently and sang hymns, 200 miners entombed in the North Hamman colliery, near Tawdor, were liberated June 16. The men were caught by a cave-in, but all were safely rescued.

Christiania, Norway—An international conference, unique in history, was recently convened at Christiania with delegates from the United States and Russia, Norway, and other European countries in order to frame a government for the Spitzbergen Islands. Although these islands have been known to the rest of the world for centuries, it was not until within recent years that the coal deposits upon them were discovered and have started to be worked. The American interests now controlled by a Boston corporation are said to have about \$750,000 there invested. There appears to be no precedent in history for the assembly of an international congress to formulate a government for a land over which no nation claims sovereignty.

PERSONALS

J. O. MacIntosh has been admitted to the firm of Renshaw & Co., coal shippers in the Land Title Building, Philadelphia.

Robert McCune on June 17 at Colorado Springs, Colo. was married to Mary Bateman Bothwell. The couple will make their home in Dawson, N. Mexico.

H. C. Hamilton, a banker of Girard, Ill., has been appointed receiver for the Farmersville Coal Co. The liabilities of this firm are placed at \$30,000, while the assets are undetermined.

Hugh Ike Shott and Edward Cooper, both of Mercer County have announced their candidacy for congress from the Fifth District of West Virginia. Shott is the editor of the Bluefield Daily Telegraph, while Cooper is a coal operator of Bramwell. The primary will be held on Saturday, July 18.

William Watts, superintendent of the Banning-Connells-ville Coke Co., has designed a new head for the covington coke extractor which is said to be more efficient in cleaning the oven and prevents breakage. He is now working on a device to prevent breakage in the passage of the coke from the conveyor to the car.

Thomas O'Brien, who has held the position of inside foreman at the Twin Shaft of the Lehigh Valley Coal Co.'s Seneca colliery, for the past nine years, has tendered his resignation to take effect June 30. His successor has not yet been appointed, but will probably be announced in a few days. Other changes in the inside officials of the Twin Shaft are said to be pending.

OBITUARY

Jesse Hilles, at one time head of the coal firm of Hilles, Boyd & Co., for many years sole representatives of the coal interests of the Pennsylvania R.R., died at Govans, near Baltimore, recently. He retired from business when his firm was absorbed by the coal department of the Pennsylvania in 1904.

George D. Whitcomb, the founder of the Geo. D. Whitcomb Co., died in California on Sunday, June 21. Mr. Whitcomb has been retired for a number of years and has lived at his home at Glendora, Los Angeles County, California. He was born in 1834, therefore, was in his eightieth year. He developed the "Harrison mining machine," which was the first successful mining machine of the puncher type put on the market and has been more or less identified with the mining trade, first as an operator, afterward as manufacturer of mining machines, for a great many years and has many friends among the older operators.

TRADE CATALOGS

H. K. Porter Co., Pittsburgh, Penn. "Modern Compressed-Air Locomotives." Pamphlet of 80 pp., 6x9 in., with many illustrations, tables, etc.

Schaum & Uhlinger, Philadelphia, Penn. "Centrifugal Extraction." Pamphlet of 44 pp., 6x9 in., illustrating and describing centrifugal extractors for various industries.

The Hazard Manufacturing Co., Wilkes-Barre, Penn. Price List No. 54 "Hazard Rubber Covered Wires and Cables." Twenty Seven pages, 3½x6¼ in. unillustrated. Sent free on request.

The Laidlow-Dunn-Gordon Co., Cincinnati, Ohio. Bulletin L-523-A "Cincinnati Gear Duplex Corliss Steam Driven Air Compressors." Twenty-three pages, 6x9 in., illustrating and describing class W A and X A compressors.

The Streeter-Armet Weighing & Recording Co., Chicago, Ill. Bulletin No. 2-A. "Descriptive Circular of Automatic Weight Recorders." Seven pages 8½x11 in. illustrating and describing "the application of automatic weight recording devices as applied to weighing miners coal, low grade ores or other commodities in pit cars or in trolley or stationary weigh hoppers, etc."

CONSTRUCTION NEWS

Mater, Ky.—It is announced that the Elkhorn Coal Co. here will be ready to begin shipping coal on July 15. The building operations of the company are getting well under way.

Scottsdale, Penn.—The Scottsdale Machine & Mfg. Co. recently secured a contract from the Conemaugh Smokeless Coal Co. for tipples, cages, head sheaves, etc., to be erected on its property at Seward Station, Penn.

Whitesburg, Ky.—A new mining town is being laid off and constructed about midway between Jenkins and Burdine, in the Elkhorn Creek coal fields. The name of the new settlement is Keithly. A considerable number of buildings is under construction.

Birmingham, Ala.—Orders have been placed and the material is now on the way with which to rebuild the coal benches in the gas plant of the Birmingham Railway, Light & Power Co. The rebuilding of these coal benches is the initial step in the complete remodeling of the gas plant.

Superior, Wis.—It has been officially announced that the Northwestern Fuel Co. will rebuild its big coal unloading rig on Dock No. 1, the work of construction to begin within two weeks. The new work will be in charge of the Heyl & Patterson Co. and will cost somewhat over \$100,000. The new bridge will be ready for operation within three months.

Youngstown, Ohio.—George W. Caldwell, president of the Caldwell Construction Co., who has the contract for the building of the line of the Lake Erie & Youngstown R.R., announces that the road will be constructed despite protests of financial interests. The construction of the line will mean an outlay of \$4,500,000, of which two-thirds has been underwritten.

Birmingham, Ala.—In order to encourage water traffic in Alabama and to adequately serve its patrons in Mobile, it has been announced that the Pratt Consolidated Coal Co. will open some mines on the Warrior River, 8 miles from Tuscaloosa. Investigations are now being made to ascertain the best location for development on the river, which development will be started soon.

NEW INCORPORATIONS

Columbus, Ohio.—Papers have been filed by the Pomeroy Coal Co., of Columbus, reducing the authorized capital from \$50,000 to \$5000.

Little Rock, Ark.—The Arkansas Coal & Mining Co., with Jesse Edwards as president, has increased its capital stock from \$1000 to \$10,000.

Boonville, Ind.—The Crow Creek Coal & Mining Co. has been incorporated here, with \$15,000 capital stock. The directors are William Gough, O. M. Baldwin and L. Gough.

Columbus, O.—The Maple Hill Coal Co. has been organized for the purpose of mining coal. The capitalization is \$25,000, and the incorporators are M. L. Phelps, T. C. Collins, H. G. Morse, G. I. Rose, and B. S. Morten.

Akron, Ohio.—The Kimbolton Coal Mining Co. has been incorporated with a capital stock of \$600,000, for the purpose of dealing in coal lands and similar properties. The incorporators are W. M. Graham, Harley J. Motts, Frank Schreider, T. C. Woodward and C. F. Schnee.

Somerset, Penn.—The Arrow Coal Mining Co. capitalized at \$50,000, has been organized with William Gahagen as president, and Harry Gahagen as vice-president. The town of Arrow now consists of 57 dwelling houses, a church and a school house, but it is planned to erect possibly 100 more dwellings.

INDUSTRIAL NEWS

Nevada, Kan.—Throgmartin & Gardner, drilling five miles southwest of Nevada, struck a 4-ft. vein of coal at a depth of 400 ft. The property will be developed.

Columbus, Ohio.—Permission has been granted by the Ohio Utilities Commission for the Kanawha & Michigan R.R. Co., to issue trust certificates in the sum of \$1,200,000 to purchase 1160 steel Gondola cars.

Roundup, Mont.—J. H. Price & Sons, of Pittsburg, Kan., on July 1, expects to begin sinking a 200-ft. shaft for the Roundup Coal & Mining Co., a subsidiary of the Sheridan Coal Co. Several Kansas operators wish to inspect the Montana field.

Toledo, Ohio.—The first cargo, a large freighter loaded with 2000 tons of coal, cleared from the new Hocking Valley docks at Toledo last week. These docks are of concrete and were erected at a cost of \$2,000,000, being equipped with loading machinery of the latest approved pattern.

Baltimore, Md.—The Interstate Commerce Commission, acting on protest, has changed the date of operation of the 7c. increase on coal shipments inside the Capes from June 20 to Oct. 18. A hearing will be held to give both sides a chance to present the case before the latter date.

Harrisburg, Penn.—Complaint has been filed with the Public Service Commission, by the Eddystone Manufacturing Co., against the New York Central and the Reading railways contending discrimination in a tariff which became effective on June 20. The tariff increased the rate on bituminous coal to Port Richmond for harbor delivery.

Knoxville, Tenn.—Coal operators of eastern Tennessee and Kentucky await with interest the action of the Interstate Commerce Commission on the question of eliminating and reducing differentials on coal from the southwest Virginia mines to points in the Carolinas and Georgia. Officials of the Clinchfield, Carolina & Ohio R.R. have asked that certain differentials be eliminated.

Sellersville, Penn.—A vein of anthracite was struck by Elmer Stear, a farmer in Blooming Glen, near Sellersville, while plowing his land. A specimen was taken to J. G. Moyer's Sons Co., at Perkaspie, who pronounced the discovery a fine grade of anthracite. A mining expert examined the coal and gave as his opinion that the lower stratum is richer still.

Chicago, Ill.—The interest on the Chicago & Indiana Coal Ry.'s 5 per cent. bonds due in 1936, has been defaulted. This railway is part of the Chicago & Eastern Illinois, the receivers of which have declared in a petition to the court that they have no money with which to pay the interest, and that a default would have to be made resulting in foreclosure of the mortgage, as well as a technical separation of the two properties.

Monongahela, Penn.—Coal men in the Monongahela Valley are prepared for a good coal trade during the coming month. The first shipment of Monongahela Valley coal to Panama is on its way south by way of the Ohio and Mississippi Rivers to New Orleans. For months, coal men of western Pennsylvania, Ohio and West Virginia, have been preparing for the opening of the Panama coal trade.

Columbus, Ohio.—For the burning of its Perry County mine in June, 1912, the Rock Run Coal Co. recently secured an \$8000 damage verdict against the Chartiers Oil Co. in Judge Kinkheads court. The coal company sought \$50,000. It was alleged that oil from the Chartiers wells had percolated into the mine of the Rock Run company, making it inflammable, that when miners blasted the coal was ignited and the entire mine consumed.

Coal Trade Reviews

General Review

Anthracite rounds out the month in better form than anticipated. Eastern bituminous market at the lowest point for a long time. Situation at interior points picking up under the influence of the large crops and the long suspension in Ohio.

The anthracite movement for the month has been heavier than anticipated. The business carried over from May developed to unexpected proportions and the market is rounding out the current month in good form with some orders going over into July. The large companies, holding rigidly to their circular quotations, are, of course, experiencing difficulty in moving certain sizes which are in long supply. The heavier movement in the Lake trade is tending to relieve the pressure to a certain extent. While the customary summer lethargy is anticipated during the next two months, there is a generally hopeful feeling in the trade, and the opinions are freely advanced that the fall activity will set in earlier than usual.

On the Atlantic Seaboard, the various distributing centers are still flooded with bituminous coal, while even the scattering orders of a few weeks ago have disappeared. Further recessions and discouraging reversals have been the rule during the week, leaving the market in the poorest shape for a long time. With an excessive amount of coal on hand at Hampton Roads, the demand slack and the movement confined almost entirely to contract business, the outlook is not encouraging at the moment. Nominal prices are still asked, but concessions are readily obtainable. The most encouraging feature in the situation is the absence of demurrage coal, indicating that tonnages are closely held.

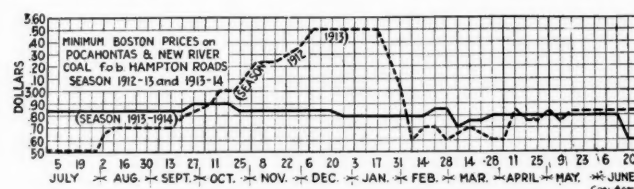
The manufacturing demand in the Pittsburgh district is on the increase, while a continued heavy movement into the Lake trade is keeping operations relatively active and on about 75% the nominal capacity; prices are weak in the spot market, heavy cuts being reported in some instances, but on contracts the full circular quotations are generally obtained. The complete deadlock at the wage-scale conference in Ohio last week has again thrown the trade there into a general uncertainty. Even though an agreement is reached shortly, it will require so much time to reconstruct the tipples in order to comply with the requirements of the new screen law, that it is clear the Ohio mines will not be much of a factor in the Lake trade this season. The elimination of the three million tons per month produced in the Ohio fields is undoubtedly creating a shortage in those markets, by which the adjoining districts are materially benefited.

In the Southern markets the poorer qualities are in excess supply and rather difficult to move, but the better grades are showing an improved undertone, even occasionally being reported in short supply. Restriction in mining operations is still the rule, although shipments to the gulf ports are showing up well.

The crop movement and the long suspension in Ohio are beginning to have their effects on the Middle Western situation where a gratifying improvement is noted. The opinion is general that the low point of the trade has been turned, and, although mining operations are still irregular, sacrifice prices are by no means so much in evidence.

to make. More steam colliers and sailing vessels have been laid up the past week because of the slack conditions; coal is standing in as large volume as at any time thus far, at practically all the loading piers. Where a fortnight ago there were scattering orders coming in, the market now is at a standstill and almost no sales are reported.

In addition to the already accumulated tonnage to be moved from Hampton Roads there develops an extra supply of slack coal, due to a slightly better demand from the West for prepared sizes. The market price of run-of-mine, however, is so frankly at a basis well down to \$2.60 f.o.b. that a small differential less will hardly induce orders for slack. It would be hard to imagine a duller market than we are now going through.



On the Pennsylvania grades there is little that is new. A few orders dribble through to the different operators, but the movement to this territory is very light. Water freights on anthracite transportation, ordinarily diverted at this time to bituminous, are kept at so high a range from Philadelphia to Boston that consumers are either chartering transportation outside at market rates or are accepting deliveries only as they are absolutely required.

Georges Creek continues to come forward with the usual regularity, but the movement of this grade is confined almost exclusively to contract business. The shippers are still able to hold their season f.o.b. price on this grade, the only steam coal in the market of which such a statement could be made.

Anthracite—Domestic sizes are not coming forward as freely as was expected. The orders that held over into June were understood to be light, but at this writing most of the companies are a week or two behind on deliveries. Stove is still in shortest supply. June was expected to be a dull month, but now there is a good chance that there will be some business to carry over for July shipment.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	\$0.90@1.40	\$1.10@1.55	\$1.67@1.77	
Philadelphia*	2.15@2.65	2.35@2.80	2.92@3.02	
New York*	2.45@2.95	2.65@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.60@2.85
Boston†				3.35@3.63
Providence†				3.25@3.63

* F.o.b.

† On cars.

NEW YORK

Tidewater situation duller than for a long time. Further price recession on the lower grades. Anthracite companies wind up the month with a heavier production than anticipated. General restriction expected in July.

Bituminous—The soft-coal trade during the past week has been the poorest for a long time. It has been a series of further recessions and discouraging reversals with the operators. Production in the Pennsylvania regions shipping this market was down to 40% capacity or even less. The Berwind-White Co. continues working under curtailed operations, and conditions in the bunkering and steamer trade generally have seldom been duller many vessels having been laying here for two and three months awaiting cargo.

Perhaps one of the most encouraging features in the market is the fact that there appears to be little or no coal on demurrage. This indicates a determination on the part of the operators to hold tonnage closely and close down when consumers refuse to meet their figures. A moderate increase in West Virginia gas-coal prices is also noted; this is due to a combination of causes, such as the exhaustion of surplus stocks in the hands of the consumers, a better demand in the West and Northwest, and to an incipient car shortage, which,

ATLANTIC SEABOARD

BOSTON

Market listless with almost no redeeming features. Prices weak and coal still accumulating at every port. Pennsylvania operators shade quotations under pressure, but Georges Creek remains steady. Anthracite deliveries slowing up.

Bituminous—The trade is at low ebb. The Pocahontas and New River situation continues weak and while fairly strong prices were submitted to the Government for deliveries extending through the season, it is recognized that the spot market is still soft and in control of the buyers. The various New England tidewater distributing points are still glutted with consignment coal and sales are extremely hard

although not affecting operations as yet, is nevertheless causing serious apprehension over outlook this fall when the movement becomes heavy.

The better grade coals are still being firmly held at the regular circular, but the off qualities are suffering some recessions, and the market is now quotable on the following basis: West Virginia steam, \$2.50@2.60; fair grades Pennsylvania, \$2.55@2.65; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—About normal conditions prevail in the hard-coal trade. If anything the market seems to have held somewhat steadier than was anticipated early in the month, and it is now evident that all but a very few of the large companies will conclude the month under full-time operations. However, the outlook for next month is dubious. Even now prompt shipment can be obtained on practically any order placed, and it is clear that the current business is coming rapidly to a finish. So far, the Reading and the Susquehanna companies have been the only large operations to materially restrict production.

Stove coal, of course, still continues the leader, and there is little prospect that the mines will be able to completely satisfy the demand for this grade. Isolated cases are also reported of shortages in buckwheat, Nos. 1 and 2, but these are the exception rather than the rule. Chestnut is in long supply with considerable going into storage, and the same applies to the steam grades in general with the possible exception of the different sizes of buckwheat as already noted.

We quote the New York hard-coal market on the following basis:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$4.80	\$4.60@4.80	\$4.75	\$4.55@4.75
Egg.....	5.05	4.95@5.05	5.00	5.00
Stove.....	5.05	5.05	5.00	4.85@5.00
Chestnut.....	5.30	5.15@5.30	5.25	5.00@5.25
Pea.....	3.55@3.60	3.30@3.55	3.45@3.50	3.25@3.50
Buckwheat.....	2.80	2.60@2.80	2.50@2.75	2.00@2.75
Rice.....	2.30	2.20@2.30	2.00@2.25	1.50@2.25
Barley.....	1.80	1.60@1.80	1.70@1.75	1.25@1.70

Water Freights—The "Journal of Commerce and Commercial Bulletin" reports the situation in water freight as follows: The full cargo steamer market was steady and unchanged, and a fair amount of business was reported in chartering, including two large carriers for government coal from the Atlantic range to Cavite, P. I., one for July loading, the other for September. South America and long voyage freights continue to offer sparingly. Rates hold fairly well in all trades, with owners asking an advance in some instances. The sail tonnage market shows no signs of improvement, the demand being exceptionally light.

PHILADELPHIA

Practically no change in the anthracite situation. Production still continues fairly large. Better feeling in bituminous. Demand improving but prices on about parity with last week.

Anthracite—The close of this week finds the anthracite trade rapidly approaching mid-summer dullness. Notwithstanding the curtailment of mining, however, there is a very appreciable tonnage moving. Shipments to the Lakes are comparatively heavy, although not as great as the corresponding period of last year. The line and local trade is very dull, with demand centering mostly on stove size. Of course, this is applicable to the large companies; individuals are having no trouble in moving their output, but at greatly reduced figures.

All sizes, with the possible exception of stove, are quoted at considerably less than the circular and it is not expected that there will be any tone to the market during the succeeding two months, a situation not at all unusual at this season of the year. But there does appear to be a feeling that activity may be looked for earlier this year than usual. As a rule, the market remains in a depressed condition until well along into September, but many of the operators look for the latter part of August to show up well. New England business at Tidewater still continues in sufficient volume to keep the large fleets sailing from this port, well occupied, but it is understood that there is very little waiting to have requisitions filled.

Bituminous—There seems to be a slightly better feeling in bituminous. Stocks of coal at industrial establishments are slowly but surely dwindling, notwithstanding the fact that many of them are operating short time, and these concerns are now looking the market over. Solicitations to contract, however, are not met with any degree of warmth, the purchasing agents apparently feeling that they can do better on the open market, at the present time, than by tying themselves up to any specific figure.

BALTIMORE

Signs of activity to the Westward offer encouragement in spite of the slow local conditions. From time to time there is a little spurt. Anthracite men plug away on a fairly active call for household fuel.

While the soft coal market is generally dull there are indications of an awakening in the West that are encouraging to the trade as a whole. From spots in the Middle West as well as from points along the Lakes come inquiries for fuel in comparatively small amounts. There are no big closings and it is rather difficult to put a finger on the improvement as a whole, but there is apparently a somewhat more hopeful spirit.

Mine production is averaging not more than three or four days a week. The Northwest is being supplied largely by the Fairmont district of West Virginia and this has added a little strength there. Slack, that sold down to 50c. recently, was commanding as high as 60c. in some cases. Three-quarter gas remains steady at 85c. Little or no change is noted in the Pennsylvania market, prices holding about the same as for the past three weeks; the cheapest fuels are obtainable around 95c., medium grades at from \$1.05 to \$1.15 and best qualities at from \$1.25 to \$1.35.

Anthracite men keep plugging away locally apparently with fair success. The household trade for storage purposed is now about up to the June mark.

HAMPTON ROADS

Movements during week about normal. Government taking coal for stations on Pacific Coast and vessels in Mexican waters.

Dumpings for the past week average up well, although there have been days when little work was done at any of the piers. The demand still continues slack and it is believed that practically all coal moving has been on contract business. As is usually the case the heaviest shipments have been to New England with foreign cargoes to Naples, Venice, Brindisi, Vera Cruz, Havana, St. Lucia, Canal Zone, Montevideo, Port of Spain, Gibraltar and Santiago.

Coal has been loaded by the government for the naval stations at Mare Island and San Diego and, in addition to the coal for the Pacific Coast, two colliers have been loaded to supply vessels now stationed at Vera Cruz. Steamers for bunkers have arrived in fair numbers and it is believed that the movement so far this month is already in excess of the total for May.

Although the amount of coal on cars in the railway yards is still somewhat above normal, circular prices are still being quoted and so far as can be learned there is no prospect of any reduction being made. Present indications are that unless there is an extra-heavy arrival of vessels for cargoes this week the dumpings for the month of June will fall considerably behind the May figures.

LAKE MARKETS

PITTSBURGH

Mining operations unchanged. Lake movement fairly heavy. Manufacturing demand picking up slightly. Contracts being closed slowly. Prices somewhat irregular, particularly on prompt.

Coal production in the Pittsburgh district is at an estimated rate of about 75% of nominal capacity, though it is probably not two-thirds of what the district could mine and ship under pressure. The chief demand continues to be for the Lake trade, to which market the state of Ohio is contributing hardly anything since practically all the Ohio mines are still closed awaiting more light as to what can be done under the new Green law which provides for a mine-run basis of payment. Some lawyers express the opinion that operators could make individual contracts with miners providing for a screened-coal basis of payment. The state of Ohio is certainly suffering from the law, and it seems fairly safe to assert that Pennsylvania will never enact such a law.

Manufacturing demand for coal is picking up somewhat as the steel mills are running slightly better and stocks are now nearly exhausted. Many season contracts with manufacturers are not yet closed and negotiations are proceeding somewhat slowly. On contracts, regular open prices are shaded but little if at all, while on spot lots there are frequently large concessions, particularly for slack, which has sold down to 55c. at some points. Regular prices are: Slack, 90c.; nut and slack, \$1.05; nut, \$1.25; mine-run, \$1.30; ¾-in., \$1.40; 1¼-in., \$1.50, per ton at mine, Pittsburgh district.

BUFFALO

The bituminous market is steady, but quiet. Mines running with much caution. Canadian market more quiet. Much complaint of West Virginia competition. Anthracite doing very little.

Bituminous—There is a slight stir in the trade among small consumers, who appear to be about out of coal, but the larger concerns are buying sparingly and will not come into the market for some weeks yet, as it is hard to say just what their running needs are. The sellers do not dare to allow any coal to accumulate on their hands as they are likely to have to dispose of it at a sacrifice. All reports from the Canadian market agree that the industrial situation there is still more quiet than it is here. Iron furnaces are doing little and other factories are by no means active. Money is scarce there, so that collections are difficult to make.

There is complaint that some of the West Virginia operators had much to do with spoiling the bituminous market of this district. There was an effort there to keep the mines running, so that the men would not scatter, and the coal had to be distributed over a wide territory and sold for what it would bring. The railroads are beginning to buy cars and will probably go into repair work, very extensively next month while the large crops are bound to stimulate business. If a fair percentage of the advance in freight rates is granted it will all contribute toward greater activity. The bituminous market is fairly steady, but only the best coal can be sold at quoted prices, which are: \$2.80 for Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine-run and \$2.15 for slack, with Allegheny Valley sizes from 15 to 25c. lower.

Anthracite—The demand for anthracite is down to the mid-summer level, so that the movement is confined to storage for the winter. City demand is normal, but they did not get an average amount of business early and that means a big rush next fall. Shipments by Lake continue to increase. One leading company is loading at full capacity and most of the others are active. The amount reported for the week was 171,000 tons. Some members of the trade think there will be more Lake coal shipped this month than there was last June.

TOLEDO

Market still flat but a few more inquiries are noted and a more optimistic feeling prevails. Active business anticipated when the crop movement gets under way. Lake shipping still relatively light as yet.

Despite the continued featureless condition of the local market, Toledo dealers continue optimistic. It is generally believed that despite the depression evident among business concerns of all kinds, the coal trade is bound to pick up shortly. Orders are already beginning to come in better than for some little time and inquiries denote a more healthy tone. The large crops will make an unusually heavy demand for threshing coal and it is believed that most of the factories will resume regular operations within a short time.

The railroads, of course, are not using their normal quota as many trains have been laid off altogether. The idle cars on all roads are said to be greatly in excess of last year due, in part, to the fact that the Lake shipments are much less. It is no uncommon thing to see large freighters tied up at the Toledo docks idly awaiting a cargo, while last year every boat that could be secured was pressed into the service. A few of the railroads have placed orders for freight cars, including a large number of coal cars, but it is not believed by coal men here that the roads can begin to handle the traffic when the crop movement starts. There are some who anticipate a car shortage as bad as anything in past history a little later in the season when rush orders for Up-Lake coal begin to come in. Steam and domestic coal will also be in good demand a little later in the season.

COLUMBUS

Another adjournment of the wage-scale conferences without any agreement. Increased demand and prices showing a strong rising tendency. Lake trade improving slightly.

The wage-scale conferences, under the auspices of Governor Cox proved a total failure and the meeting adjourned with the deadlock as complete as ever. Both sides refuse to make any concessions whatever and the outlook for a settlement is discouraging in the extreme.

An increase in the demand for coal was reported during the week. Steam users are now buying from West Virginia and prices, which were formerly extremely low, are advancing. West Virginia lump is quoted at about \$1.35@1.45, while ¾-in. is sold at \$1.20. Mine-run is selling around 85¢@90¢. Slack and nut, and pea and slack are still quite low. Railroads are also buying considerable fuel, and in some cases they are confiscating cargoes on their lines.

There is also an increased demand for domestic grades and prices are ruling firm. Considerable West Virginia coal is being received. Dealers stocks appear to be sufficient for current orders.

The Lake Trade is showing more activity, although there are many drawbacks. Considerable West Virginia coal is being shipped through Ohio to the Northwest.

What quotations are being made in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump....	\$1.50@1.40		\$1.50@1.40	\$1.50@1.40
¾-in.....	1.35@ 1.30	\$1.20@1.15	1.35@ 1.30	1.30@ 1.25
Nut.....	1.30@ 1.25		1.25@ 1.20	1.25@ 1.20
Mine-run.....	1.15@ 1.10	1.10@ 1.05	1.15@ 1.10	1.10@ 1.05
Nut, pea and slack.	0.85@ 0.80		0.85@ 0.80	0.80@ 0.75
Coarse slack.....	0.75@ 0.70	0.85@ 0.80	0.75@ 0.70	0.70@ 0.65

CLEVELAND

Quotations for August delivery at low figures, even for current business. The Lake trade is showing signs of curtailment.

Youghiogheny operators have sold slack as low as 55c. for delivery during August making the price here \$1.55 which is the same as current quotations. This competition has compelled Fairmount operators to quote slack at 40c. As the freight rate from the Fairmount field to Cleveland is \$1.15, the West Virginia gas coal comes into this market at \$1.55 delivered.

Although another meeting of Ohio operators and miners will be held this week, the outlook is far from promising for an immediate settlement. The Ohio operators would have to meet the competition of the two states now fighting for the local business.

The Lakes are not offering an outlet of any consequence. The Upper Lake docks are loaded down with coal that is not being moved. The demand in the harvest fields has not started and until it does the Upper Lake docks will not be relieved. With the shipping of grain Lakeward, railroads will take coal West and will also increase their own consumption. The indications are for the largest crop in years and a big demand is expected from this source within thirty days. This northwestern trade is all the Upper Lake dock companies have to look forward to. The iron ore mines are working only part time or with reduced crews and are using less than half their normal amount of coal.

The vessel situation is so easy, boats are waiting at loading ports from three to five days. The congestion is serious, from the boat owners view, at Sandusky, Toledo and Lorain. At Toledo, Monday, the Hocking Valley loaded the first cargo over its new dock. It will use the dock the rest of the season which will relieve the congestion at that port to a certain extent.

Prices quoted this week for shipment are as follows:

	Pocahontas	Youghiogheny	Fairmount
Lump.....	\$3.05		
Lump, 14-in.....		\$2.35	
Lump, ¾-in.....		2.25	\$2.00
Mine run.....	2.60	2.15	1.90
Egg.....	3.05		
Nut.....		2.20	
Slack.....	2.20@2.35	1.55	1.55

CINCINNATI

Conditions not improved, but the feeling is slightly better, due to the belief that there will be a serious shortage later. Indications are that buying in all quarters will soon improve.

Manufacturers still refrain from taking any large amount of steam fuel and operators find the same difficulty in disposing of their screenings; although the demand for the prepared grades is not what it should be, the total lack of a market for nut and slack is one of the worst features just now. The improved Lake Movement and an ample car supply have encouraged the trade considerably, and it is hoped that the Northern markets will have stored their usual supply before this immediate section begins to demand coal.

In fact, many large consumers and dealers alike are beginning to realize that the prolonged strike in the Ohio field and the curtailed production in West Virginia, is going to bring about a heavy shortage on the year's production. This feeling is already evident from the increased willingness to contract at good prices for deliveries later in the summer. The prospects for an early resumption of work in the Kanawha field have not altered this tendency, the general impression being that the production there will hardly be able to keep pace with the late summer demand. The caution with which operators are contracting for July and August deliveries is one of the best possible indications of a coming improvement.

DETROIT

Market steadier with a generally better undertone. Large crops expected to stimulate more business. Full circular prices the rule.

Bituminous—It is apparent that there are a number of influences now tending to strengthen the local market. These have not progressed sufficiently to have any material ef-

fect as yet, but there is a generally more optimistic feeling. One of the most important factors in the situation is the prospective improvement in railroad circles. In the event that the roads secure the advanced rates asked for, it is expected that a general improvement will result all along the line, together with a large increase in the fuel consumption.

UPPER LAKE PORTS

Duluth-Superior docks glutted with coal and little moving out. Beneficial effects of the large crops wiped out by the general pessimism in iron circles.

The coal docks at Duluth-Superior are loaded down. There is not a dock with any space and very little coal is going out. The iron country is pessimistic because the ore mines are practically at a standstill. Many of the open pits are not being worked and shaft mines are doing nothing except on special orders, which are few and small.

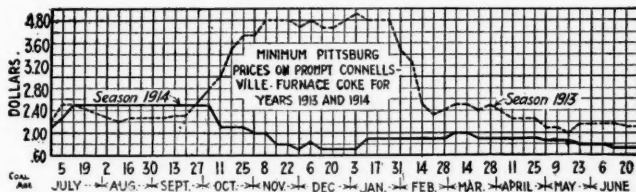
There is going to be good fall interior trade because the grain crop is abnormally large. The light demand for mining purposes is the principal drawback. Away from the iron country the feeling is much better. The crops look so good that people are quite hopeful and are not particularly worried over the future. This is true only among the farmers, the cities being pessimistic as a rule.

COKE

CONNELLVILLE

Optimistic reports in the steel trade create a better undertone in coke. Prices steadier except on foundry coke.

A firmer attitude as to furnace coke prices is noted on the part of some operators, who seem to have become convinced within the past week that decidedly better times are in store for the iron and steel trade in the near future. There is less disposition than there was to shade \$2 on furnace coke contracts, but prompt coke is as cheap as ever, being usually offered at \$1.75 in limited quantities. An Eastern consumer is rumored to have purchased about 10,000 tons a month over second half at \$2, purchasing a smaller tonnage of medium grade coke at a lower figure. As a rule negotiations on contracts proceed very slowly, and the majority of consumers not already covered will probably buy from hand to mouth after the close of this month.



Foundry coke prices have been sliding off. While two or three large operators still have an asking price of \$2.65 there is hardly any prospect of their securing this figure, since at least one large interest making one of the most highly regarded cokes in the region has sold at \$2.35 if not lower. Some indifferent brands are offered down to \$2. The market is quotable as follows: Prompt furnace, \$1.75@1.85; contract furnace, \$1.85@2; prompt and contract foundry, \$2.30@2.50, per ton at ovens.

The "Courier" reports production in the Connellville and lower Connellville region in the week ending June 13 at 259,615 tons, an increase of 16,006 tons, and shipments at 253,352 tons, a decrease of 1479 tons.

BUFFALO

There is a light movement of coke and a general dissatisfaction expressed with the trade. So much fault has been found with coke in recent years that the bituminous jobbers have quite often gone out of it. The seller found, as a rule, that he could dispose of two cars of coal while selling one of coke and the complaint would be less. Shippers hold that the difficulty is more often with the consumer than with the product of the ovens; one shipper states that he almost invariably had difficulty every time a customer changed foremen. The market is bound to be quiet till iron is more active, though the ovens are looking for something better in the fall. Quotations are fairly steady at \$4.25 for best Connellville foundry and \$3.25 for stock coke. Domestic sizes are hardly quotable.

COLUMBUS

The coke trade is holding its own, despite the general business depression. The demand is not so heavy and shipments are not up to the usual figure.

BIRMINGHAM

Furnace and foundry coke remain quiet with scarcely anything doing. There are a number of small sales of pig iron and while the aggregate tonnage is not large, it is far ahead of the May business, with prices about the same.

CHICAGO

While dull conditions prevail in the hard-coke market, an improvement is hoped for after July 1. It is expected that prices will remain steady for several months. In anticipation of the fall rush there is more buying of byproduct cokes. The market is quotable as follows: Connellville and Wise County, \$5@5.25; byproduct egg, stove and nut, \$4.65; gas-house, \$4.25.

ST. LOUIS

There is some demand for coke, but it is purely in the local market. The market is quotable as follows: Gashouse, \$4; byproduct, \$4.75, both f.o.b. St. Louis.

SOUTHERN

LOUISVILLE

High-grade fuels much improved and occasionally in short supply. Off qualities heavy and difficult to move. Curtailed operations still general.

The local market has improved in the last week, so far as the high-grade steam coals are concerned, the supply not being equal to the demand. A recent search for two cars failed to produce that much of the quality required on the track anywhere in Kentucky. The demand for domestic sizes continues brisk in the Eastern field with the bulk of the shipments going to Northern and Northwestern points. Low-grade steam sizes go begging on the market and stocks are increasing rapidly at the mines and in the various yards. The railroads are not taking as much coal as could be wished and general industrial conditions have not improved to any appreciable extent.

BIRMINGHAM

Market on lump coal slightly off and steam coal quiet.

The market on lump coal is not quite as active as last week, the tonnage being lower due, probably to the extremely hot weather. Steam coal is moving slower this past week also, though shipments to the gulf ports is showing up well. Blacksmith coal is experiencing its usual summer depression.

MIDDLE WESTERN

INDIANAPOLIS

About normal June conditions prevail. No domestic coal moving, except shipments for threshers. Railroads the heaviest buyers of steam grades. Industrial demand not more than normal, if that. Indianapolis retailers have advanced prices 25c.

Conditions are not far from normal for this period. The demand for steam coal is not large. Several factories are closed as this is the season for overhauling machinery. The railroads seem to be taking as much coal as usual at this date and the crop moving season is at hand when their buying must increase. Working schedules at the mines are irregular, some companies doing better time than others. One of the largest has four of its seven mines on full time and the others on about half time. However, some mines belonging to all companies are running.

The fact that there is little or no market for Indiana domestic coals during the warm months naturally tends to restrict operations. It is no trouble to sell screenings, although premiums for this grade are scarce, due to competition from Pennsylvania and Virginia mines, which are working strong on domestic grades and have to find a market for screenings. These are reaching practically all parts of Indiana, but the freight rates makes it impossible to sell below Indiana prices. Were it not that over 50 per cent. of the railroads use 1½-in. lump, the supply of Indiana slack would be much less than the demand.

CHICAGO

Improvement evident in the Chicago market. Quiet conditions prevail in anthracite, but the smokeless trade is strengthening. Hard-coke market dull. Slight improvement in byproduct coke.

It is generally agreed that the low point of the depression has arrived and that conditions will begin to improve shortly. Prospects for the future are better in every line and the coal market naturally must benefit from the general improvement. Sacrifice prices are not so much in evidence as during the previous weeks and the disposal of the tonnage is much easier.

Various reports concerning anthracite conditions and the volume of business are in circulation. Some companies report an increase while others are just the opposite. This might be explained by the fact that June is seldom a good anthracite month.

A cleaning up of demurrage coal in the splint market has effected an improvement. Conditions also are aided somewhat by the curtailment at the mines and the general market is firm. Until recently several Franklin County operators have been naming one price for all lump coal, but within the last week a change has become effective. Sales are made to retail dealers only and the circular price, in some cases \$1.25, and in others \$1.50 is obtained.

Screenings form the principal feature of the Springfield district, with the demand exceeding the supply. There is only fresh-mined coal to satisfy the demand, prices being about 90c. a ton for the ordinary qualities and \$1 for the better grades.

Prevailing prices at Chicago are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump.....	\$2.07	\$2.30@2.40	\$2.12	
Steam lump.....	1.97		1.97	
Fgg.....		2.30@2.40		\$3.95
Mine-run.....	1.87	2.15@2.25	1.87	3.05@3.30
Screenings.....	1.62@1.67	1.95	1.62@1.67	

KANSAS CITY, MO.

Threshing on in full blast and the situation materially improved. Some competition developing with oil and gasoline.

Further improvement has been shown in the situation in Kansas City. The Kansas harvest is on in full force, and is responsible for a heavy movement of coal to the wheat fields. On the basis of one ton of coal to 50 acres of wheat, it is estimated that 175,000 tons will be required in Kansas alone. Missouri will take less than half of that amount. The railroads are handling the situation in good shape, though the crisis has not yet arrived. Coal seems to be holding its own in the harvest field, though in a few instances threshermen are utilizing oil and gasoline.

ST. LOUIS

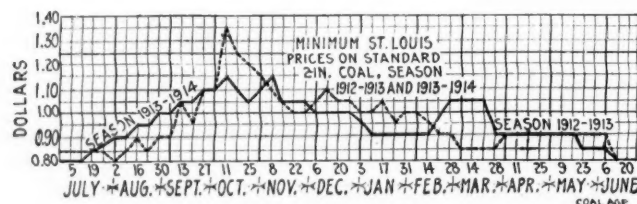
Generally better tone than for some time, although low prices still prevail in sections. Coöperative mines continue to be a leading feature in the situation.

There has been a better tone to the local market during the past week than for a long time. There seems to be a good demand for high-grade coal in the threshing fields, and this has affected to some extent the washed-coal market, which has been holding its own until the past week or ten days, when it went to pieces. The movement of high-grade has also been affected to some extent by the local demand.

The condition in the fifth and ninth district is still the same as it has been with coal going below cost. Conflicting opinions in this district as to the proper way to eliminate the present low prices is perhaps the principal reason for these. It is felt in some quarters that concerted action by the operators against the United Mine Workers giving permission to their men to engage in the operation of coal mines, would have the desired effect.

Standard screenings are holding their own, and, as a matter of fact, are worth more than mine-run and in many cases more than 2-in. lump. Screenings from the Carterville field are quoted at from \$5@90c., and steam sizes during the next two or three weeks will be in greater demand than at the present time, judging from the experience of past years.

Anthracite is moving in slow and a fairly good tonnage of West Virginia smokeless and Arkansas anthracite will arrive in the next week or ten days.



PORTLAND, ORE.

Mines on Vancouver Island are again in operation and Washington properties resume work in a small way. Demand light, owing to mild weather.

In the Puget Sound country the lignite mines are preparing to work at least a couple of days a week. Some of these mines have been closed down for a time because of the fact that the mild winter weather left consumers pretty well stocked up and the opinion is that coal for next season will be put in rather late this year.

The demand here is very light for the present.

PRODUCTION AND TRANSPORTATION STATISTICS

CHESAPEAKE & OHIO RY.

The following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for April and the ten months ending Apr. 30, 1912 and 13, in short tons:

Destination	April			Ten Months		
	1914	%	1913	%	1914	%
Tidewater.....	352,414	22	273,623	30	2,940,162	19
East.....	213,990	13	169,265	18	2,201,691	15
West.....	972,771	59	435,898	47	9,136,656	60
Total.....	1,539,175		878,786		14,278,510	
From Connections						
Bituminous.....	98,039	6	41,571	4	923,990	6
Anthracite.....	1,903		2,176	1	13,324	
Total.....	1,639,117	100	922,533	100	15,215,824	100
Coke.....	36,215		28,471		328,320	
Total.....					12,987,838	
					256,021	

FOREIGN MARKETS

GREAT BRITAIN

June 12—Conditions in the steam coal trade are apparently as strong as ever so far as very best Admiralty descriptions are concerned. Prices of second-class coals are, however, inclined to weaken, and the same may be said of Monmouthshire large descriptions. Smalls are more plentiful and prices slightly easier. Quotations are approximately as follows:

Best Welsh steam.....	\$4.80@5.04	Best Monmouthshires.....	\$4.08
Best seconds.....	4.62	Seconds.....	3.84
Seconds.....	4.32	Best Cardiff smalls.....	2.58
Best dry coals.....	4.41	Seconds.....	2.52

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are net f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days.

Coke is quoted at: Special foundry, \$6.24; good foundry, \$4.80@5.52; furnace, \$4.08@4.56.

COAL SECURITIES

The following table gives the range of various active coal securities during the week ending June 20:

Stocks	Week's Range			Year's Range	
	High	Low	Last	High	Low
American Coal Products.....	85½	85½	85½	96½	82
American Coal Products Pref.....	105	105	105	106	102
Colorado Fuel & Iron.....	27½	27½	27½	34½	24
Colorado Fuel & Iron Pref.....	140	140	140	140	140
Consolidation Coal of Maryland.....	102½	102½	102½	102½	102½
Island Creek Coal Com.....	50	49½	50	50	50
Island Creek Coal Pref.....	89½	89	89½	89½	89½
L-high Valley Coal Sales.....	170	150	165	165	165
Pittsburgh Coal.....	20½	20½	20½	23½	17½
Pittsburgh Coal Pref.....	89	89	89	93½	84
Pond Creek.....	17½	17½	17½	17½	17½
Reading.....	165½	163½	164½	172½	158
Reading 1st Pref.....	89½	89½	89½	89½	87½
Reading 2nd Pref.....	88½	88½	88½	93	87½
Virginia Iron, Coal & Coke.....	45	45	45	52	40½

Bonds	Closing Bid Asked		Week's Range or Last Sale	Year's Range
	Bid	Asked		
Colo. F. & I. gen. s.f.g. 5s.....	35	92½	92½	91½ 99
Colo. F. & I. gen. 6s.....	105	107½	June '12	73 82
Col. Ind. 1st & coll. 5s. gu.....	71	74	74	73 79
Cons. Ind. Coal Me. 1st 5s.....	70½	73	Mar. '14	73 79
Cons. Coal 1st and ref. 5s.....	89	91½	May '14	89 90½
Gr. Riv. Coal & C. 1st g 6s.....	89	99½	Feb. '14	99½ 99½
K. & H. C. & C. 1st s f g 5s.....	98½	102½	Apr. '06	93 93½
Poach. Con. Coll. 1st s f 5s.....	86½	87	Mar. '14	84 88½
St. L. Rky. Mt. & Pac. 1st 5s.....	86½	87	June '14	84 88½
Tenn. Coal gen. 5s.....	76	80	Apr. '14	77 82
Byrm. Div. 1st consol. 6s.....	102½	103½	101½	97 103½
Tenn. Div. 1st g 6s.....	101½	103½	101½	101 102½
Cah. C. M. Co. 1st g 6s.....	101½	101½	101½	101 101½
Utah Fuel 1st g 5s.....	101	101½	Mar. '14	101½ 101½
Victor Fuel 1st s f 5s.....	84	73	Apr. '14	73 73
Va. I. Coal & Coke 1st g 5s.....	90	93	91½	90 95

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100